FGPE AuthorKit – A Tool for Authoring Gamified Programming Educational Content

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ABSTRACT

We present FGPE AuthorKit, a tool to author programming exercises featuring gamification elements that provide additional motivation for the students to intensify their learning effort. The tool allows the (1) creation of exercises and their associated metadata, (2) selection and parameterization of adequate gamification techniques for a specific exercise or their collection, (3) design of the content structure and sequencing rules, and (4) importing and exporting the content in the formats of choice.

CCS CONCEPTS

• **Applied computing → Computer-managed instruction**; **Interactive learning environments**; *E-learning*.

KEYWORDS

authoring, programming exercises, gamification, programming learning, automatic assessment

1 CONTENT

While numerous open-source tools to author programming exercises supporting automated assessment exist, there is no tool, to the best of the authors' knowledge, that would support adding gamification to such exercises. FGPE AuthorKit[1] aims to mitigate this issue by providing authors with a wizard-based form editor to author gamified educational content. The tool presented here is one of the outputs of the Framework for Gamified Programming Education (FGPE) [2], an Erasmus+ international project with an objective to provide necessary prerequisites for the application of gamification to programming education. These include an open standard for representation of gamified programming exercises, so that they could be developed in different educational institutions and shared among them, an open collection of gamified programming exercises to reuse, an open interactive learning environment supporting such exercises, and, last but not least, the exercise authoring tool.

AuthorKit is a web application, with a dedicated API, which supports the authors through the whole process of preparing gamified programming exercises in two dedicated formats – **Y**et **A**nother **P**rogramming **Ex**ercises **I**nteroperability **L**anguage (YAPExIL) and **G**amified **Ed**ucation **I**nteroperability **L**anguage (GEdIL)[3]. The authoring process aims for simplicity and reusability, allowing the user to import content from popular non-gamified exercise formats, and export it or share it with other peers, internally or via a GitHub repository where all exercise data is synchronized.

The user interface, presented in Figure 1, is characterized by two separate form wizards nested under a project: one to create exercises and another to create corresponding gamification layer. The former maps each facet of YAPExIL to a step of the wizard, allowing to specify all the components of a programming exercise (e.g., problem statement or input/output test files). The latter has steps to (1) define the metadata of the gamification layer, (2) specify higher-level rewards (beyond a single challenge), (3) wire the rules of the course, (4) define the leaderboards by specifying their metrics, and (5) build the challenge tree, where each challenge may have child challenges and/or local scoped rules, leaderboards, and rewards.

One of the distinctive features of FGPE AuthorKit is that it is not focused on an automated assessment tool. Instead, it adheres to formats defined independently, allowing both a wider coverage of the concepts and a more generic authoring process, while enabling the author to import content in other formats.

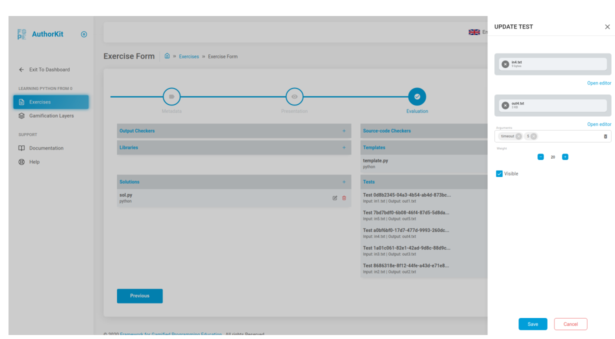

Figure 1: Editing a test in the exercise form wizard.

[1] http://fgpe.dcc.fc.up.pt
[2] http://fgpe.usz.edu.pl
[3] https://github.com/FGPE-Erasmus/format-specifications/blob/master/schemas

ITiCSE '20, June 15–19, 2020, Trondheim, Norway

ACM ISBN 978-1-4503-6874-2/20/06.
https://doi.org/10.1145/3341525.3393978