CoDiS Lab

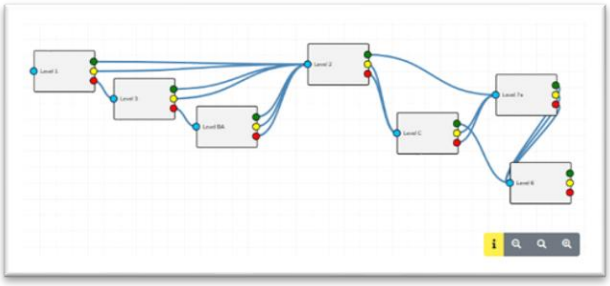
ISDS

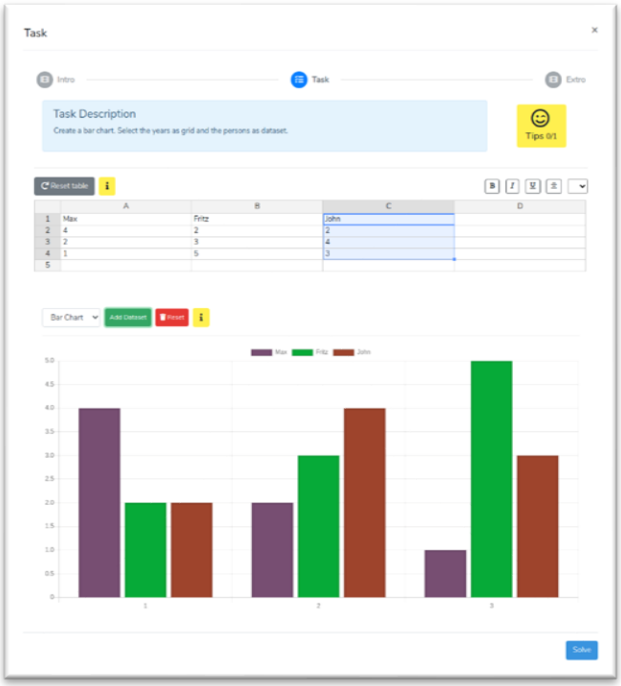
Bachelor Theses

# Development of a Modular Computer Science Learning Platform

Student: Michael Umfahrer
Supervisors: Alexander Steinmaurer, Christian Gütl

Computer science classes in school education cover a variety of topics. Learning about these topics can often be difficult in the traditional classroom learning approach. To address this problem, we want to offer an interactive learning platform that introduces students to these topics in an engaging and playful way without overwhelming the students with too much input and functionality. To cover the key concepts in the computer science curriculum, we need a modular platform where it is easy to add new content and task types. The goal of this thesis was to provide an interactive learning platform that focuses on the teaching of spreadsheet skills, simple coding, and data visualization. To realize this, we first conducted a survey of current related work. Then we evaluated the results to see how they could be used for our use case. It turns out that there is nothing suitable and therefore an own learning platform had to be developed. Our learning platform should enable students to learn various computer science related skills in a game-like manner. We want to follow a story-based learning approach, where learning objectives are packed into a story that the system navigates the user through. The idea behind this is to be able to tell an exciting story that captivates the user beyond every single tasks. We implemented the learning platform as a web application to assure easy access from everywhere, anytime and we only used open-source






software. In the backend we used PHP and used the well-known framework Laravel. As database we used the NoSQL database MongoDB. In contrast to relational databases we can easily build a modular structure with it which can be easily extended. In the frontend we used the JavaScript framework Vue.js to encapsulate the logic of the different task types in easy to maintain modules. With the help of Bootstrap we implemented a slick responsive design to assure access from any device.