TanzTaktPlaner - Optimization of Ressource Allocation

Degree programme: BSc in Computer Science
Specialisation: IT Security
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Creating schedules for a diverse group of students with highly individualized needs is a very time-consuming and complex process. This thesis aims to simplify this process by developing a prototype of a schedule-generator application capable of automatically creating schedules for students, teachers and rooms based on a defined set of inputs.

Introduction

The Bern Academy of the Arts is a department of the Bern University of Applied Sciences which offers a wide variety of education courses in the artistic field. One of those courses is the Bachelor of Science in Music and Movement, in which students have highly individualized module requirements which are taught in class, small groups or even one-on-one settings according to the module, semester and the student's specialization.
This makes the issue of schedule creation a very complex and time-intensive problem, which this thesis aims to solve.

Implementation

After a thorough analysis of input data and the resulting schedules of past semesters, a data model was developed to model the requirements and constraints of a schedule. Using this model, an algorithm based on Google's open-source CP-SAT constraint programming solver was developed.

Results

The developed prototype is capable of generating valid schedules that comply with predefined constraints, including tutor availability, fixed-time lectures, and class, group, and individual lessons. The input data is supplied as an excel file to enable non-technical users to use the prototype. The students', teachers' and rooms' perspectives of the resulting schedule as well as a per-semester-overview can be displayed in an interactive graphical user interface and exported as a PDF file.

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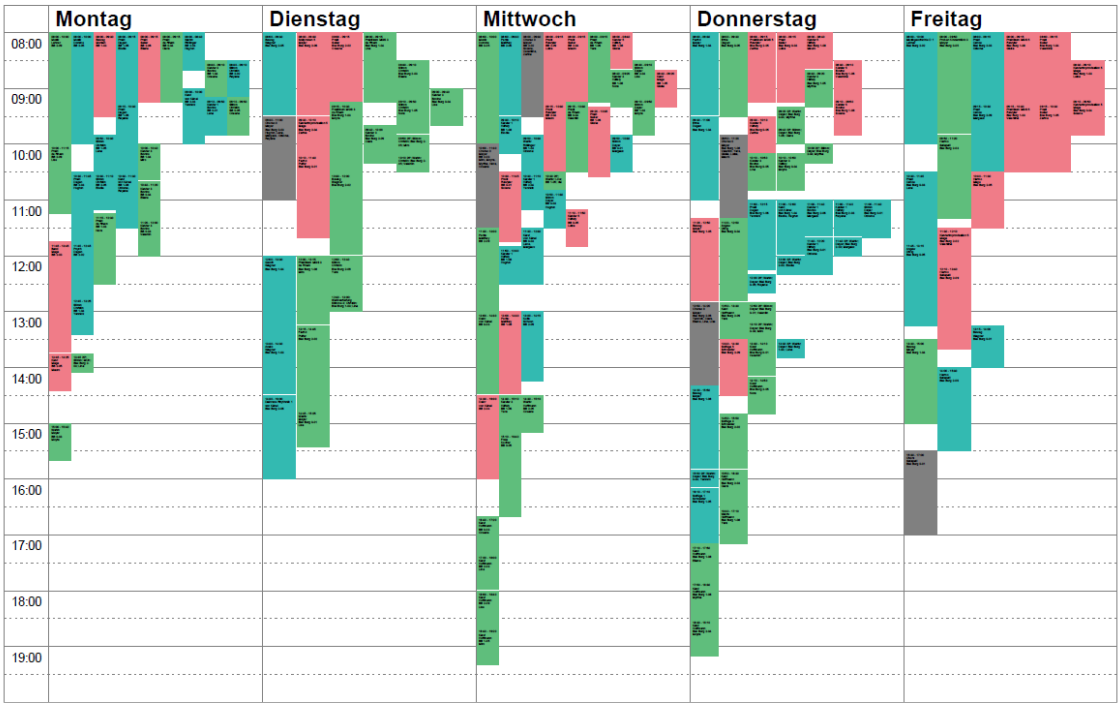

Example of a generated schedule