IDP: informatiCup 2022 Challenge - "Abfahrt!"

At a glance
- **Challenge**: informatiCup 2022 - "Abfahrt!"
- **Task**: Design and implement an algorithm for railroad timetable optimization
- **Awards**: 4.000€ - 2.000€ - 1.000€
- **Registration deadline**: 30.11.2021
- **Advisors**: Patrick Klein, Prof. Maximilian Schiffer
- **Application**: Via E-Mail (lehre@osm.wi.tum.de).

Background
In the annual informatiCup challenge organized by the German Informatics Society, students of computer science and related fields compete to develop and implement innovative software solutions for a real-world optimization problem. This year's challenge constitutes a rail network timetabling problem that aims to find a schedule that minimizes the total delay of all passengers and thus maximizes passenger satisfaction.

This IDP offers the opportunity to participate in this year’s challenge under the supervision of Patrick Klein and Prof. Maximilian Schiffer from the Professorship for Operations & Supply Chain Management.

The Problem
The Deutsche Bahn AG aims to introduce the "Deutschlandtakt" in 2021. This concept aims to establish more consistent and reliable (passenger) railroad transportation in Germany: More connections, better infrastructure, and, most importantly, no more delays. The DB aims to realize this concept through nationally integrated railroad planning on the basis of a synchronized timetable: even in regional networks, trains should run hourly or half-hourly and have one-way trip times of an our to two hours.

This undoubtedly requires a holistic, algorithmic approach to railroad planning. Here, the challenge asks for contribution: your task will be to develop and implement a software-based approach to creating optimal railroad schedules that minimize the overall delay incurred by passengers.

For more information see [https://informaticup.github.io/](https://informaticup.github.io/) where a formal problem definition can be found.
Awards
- 4,000€ for the best team
- 2,000€ for the second best team
- 1,000€ for the third place
- Bragging rights

Participating companies
- Amazon
- PPI
- netlight
- genua
- GitHub
- c't IX

Organization
You may participate in the challenge as a team of 2-4 students. We will accompany you throughout the challenge/project and provide support in the form of (non-mandatory) weekly meetings, where we can discuss implementation details and algorithmic design.

The registration period for the informatiCup challenge ends on the 30.11.2021. We however will accept requests of already registered teams after the 30.11.2021.

The challenge officially ends in March 2022, but you can of course submit your IDP earlier. You are welcome to continue working on the challenge afterward.

We will agree on an accompanying lecture according to your individual skill-set and responsibility in the team.

Timeline
- 30.09.2021: Call for participation and publication of the problem setting.
- 30.11.2021: Registration deadline.
- 16.01.2022: Code submission deadline.
- March 2022: InformatiCup finals. Here, you will need to demo your software in front of a live audience.

Requirements
To tackle the problem outlined above, you will probably have to design and implement a (meta-)heuristic or exact algorithm. This requires the following skills:

- Proficiency in at least one programming language - preferably C, C++ or Python.
- Good knowledge of data structures and algorithms
- Some experience with OR is recommended, but not required

Material
The following material may be helpful over the course of the project:

- Handbook on Algorithms
- Algorithms and Data-structures
- C++ Primer