



Shunting passenger train units: Practical planning aspects

Ramon Lentink, Pieter-Jan Fioole,

Dennis Huisman, Leo Kroon

Erasmus University Rotterdam, The Netherlands

<http://go.to/ecopt>

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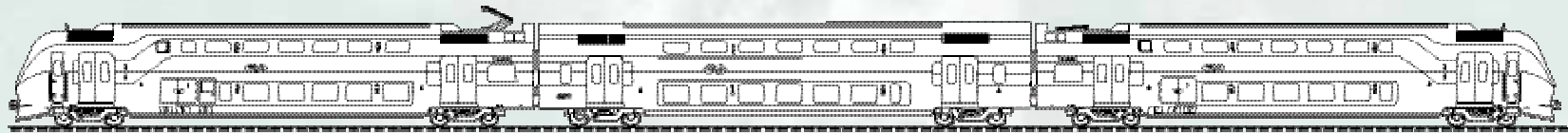


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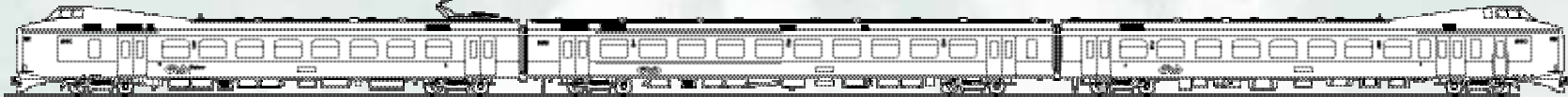
- Introduction to the problem
- Solution approach
- Demonstration of the prototype
- Summary

Examples of train units

DD-IRM



ICM3



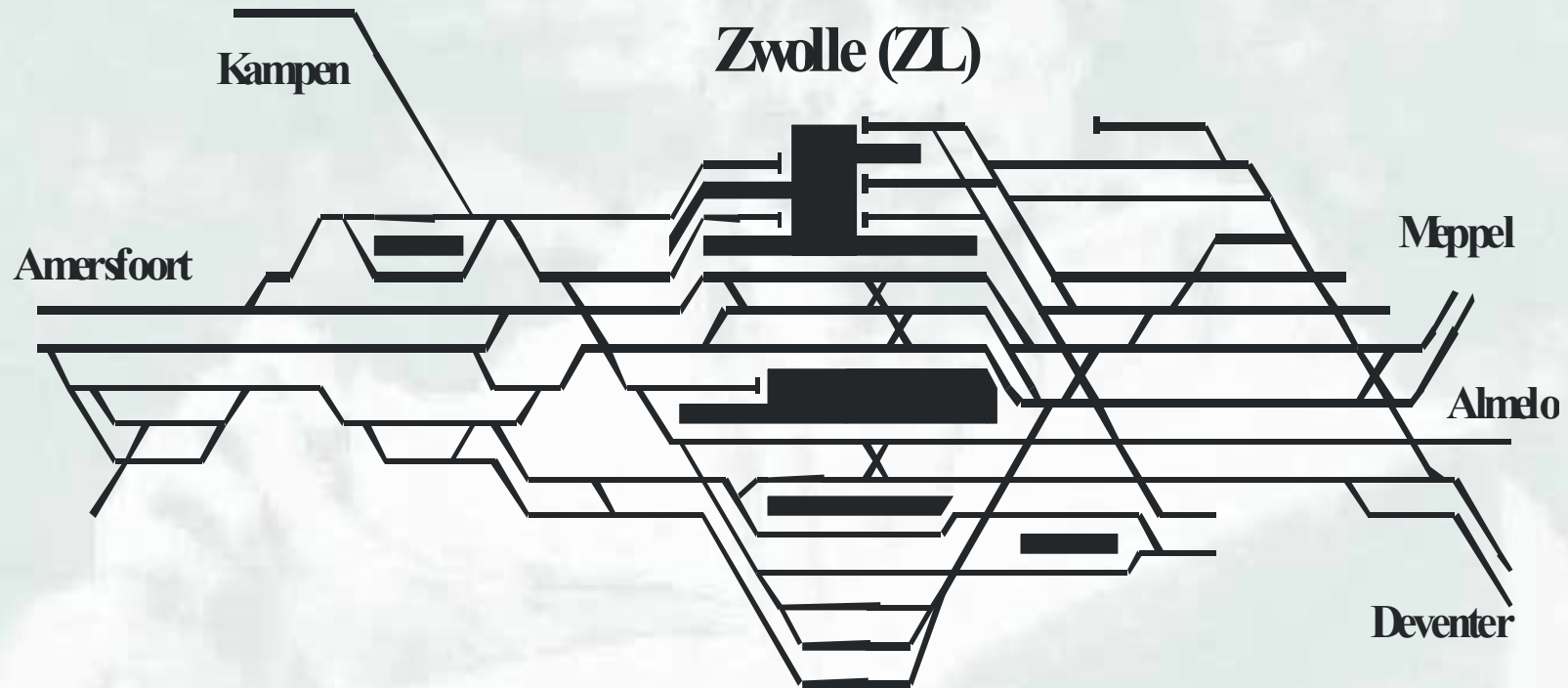
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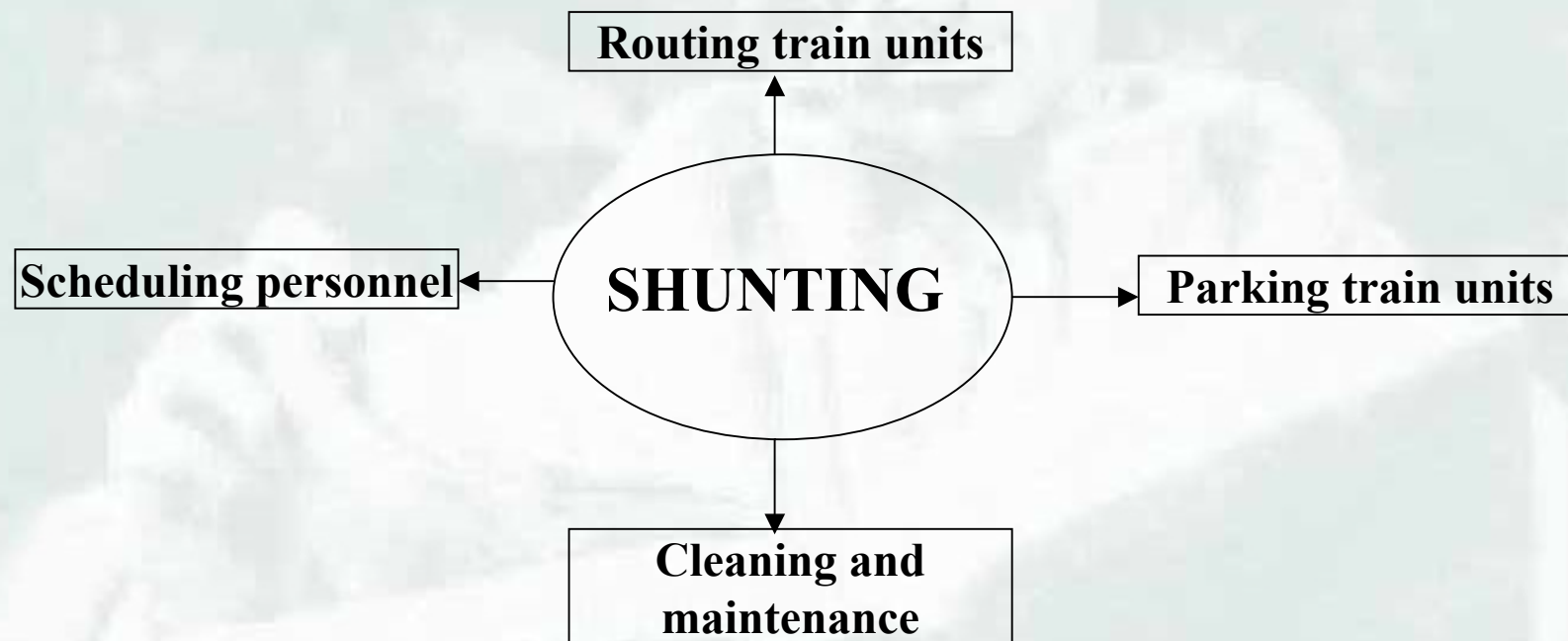
Layout of a station



Problem aspects

- Railway station and surroundings
- Arriving and departing trains
- Coupling and uncoupling of units
- Mixed arrivals and departures within planning period
- Different types of units
- Different types of shunt tracks

Shunting overview



Problem definition

- Given
 - arriving shunt units, departing shunt units, shunt tracks and station infrastructure
- Match the arriving units and the departing units and assign each unit to a shunt track between arrival and departure if necessary, such that:
 - costs are minimized, the capacity of the shunt tracks is never exceeded and there are no conflicts between arriving and departing shunt units and through trains

Solution approach

- 4 step approach:
 - 1) Match supply and demand of train units
 - 2) Generate efficient routes
 - 3) Assign units to shunt tracks
 - 4) Determine all final routes

What's new?

- Increased support for planner
- More accurate implementation (especially w.r.t. free tracks)
- Prototype evolved (e.g. input generation, integration with personnel planning, different views on the results)
- Application to a different station

Computational results I

Railway station Zwolle in the Netherlands

- 8 am - 8 am next morning in March 2000
- 19 shunt tracks, 100 - 400 meters, 16 platforms
- 84 train units to be shunted during the day, 45 - 190 meters
- Runtime third step ± 8 minutes
- 731 shunt movements

Computational results II

Railway station Enschede in the Netherlands

- 8 am - 8 am next morning in March 2000
- 13 shunt tracks, 50 - 685 meters, 4 platforms
- 28 train units to be shunted during the day, 50 - 190 meters
- Runtime third step ± 5 seconds
- 199 shunt movements

The DEMO ...

Summary

- Short description of shunting problem and implemented solution approach
- Application of solution approach to Zwolle and Enschede
- Demo of the prototype decision support system