



# OPTiMA

ARC TRAINING CENTRE IN  
OPTIMISATION TECHNOLOGIES  
INTEGRATED METHODOLOGIES  
AND APPLICATIONS

## OPTiMA SEMINAR SERIES

### DRAYAGE ROUTING WITH HETEROGENEOUS FLEET, COMPATIBILITY CONSTRAINTS, AND TRUCK LOAD CONFIGURATIONS: THREE-INDEX MIP FORMULATION AND FRAGMENT-BASED APPROACH

In this talk, we address the drayage pickup and delivery problem with heterogeneous fleet, compatibility constraints, and truck load configurations (DPDP-HCL), a rich vehicle routing problem involving heterogeneous containers and trucks. The containers can be of any size and cargo category, and the trucks are compatible with specific containers. Each truck allows different load configurations that determine the truck's load capacity to haul compatible containers. For instance, a specific type of truck might be able to carry one or two empty 20ft containers, one full 20ft container, or one (empty or full) 40ft container.

We propose two mixed-integer programming (MIP) approaches to the DPDP-HCL: a three-index formulation and a branch-and-cut approach based on route fragments. Both approaches rely on a state transition logic that establishes the load configurations allowed by each truck type and models how the trucks switch between load configurations as they pick up and deliver containers.

We conducted an extensive set of computational tests on instances involving different numbers of requests, geographical distributions of locations, time-window lengths, and fleet characteristics. With the three-index formulation, we solved instances with up to 75 requests, while the fragment-based approach allowed us to tackle large-scale instances with up to 1000 requests. We discuss the features of the instances that affect the performance of the proposed approaches.

WED 22 SEP 4PM - 5PM AEST

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