

# Workshop on CPLEX Optimization

Monday, April 11th, 2016

IBM ILOG CPLEX is the best-known linear and integer programming solver on the market. Since 1988 it has been developed and improved in close interaction with academia taking new research developments into consideration in every new release.

This workshop offers the rare opportunity to meet with key members of the mathematical core development team of CPLEX Optimization and get a broader picture of the underlying methods from the experts. Moreover, the speakers will be available for a Questions & Answers Session allowing the audience to obtain comments on issues arising in their use of integer programming solvers.

**Room:** Seminar-Room SR 15.35, RESOWI E3  
Universitätsstraße 15, University of Graz

13:50–14:00 **Welcome**

14:00–14:40 **Roland Wunderling**, CPLEX Optimization, IBM Austria (formerly: TU Berlin)  
*Linear Programming and CPLEX*

**Abstract:** In this presentation we will provide an overview of the main algorithms used today for solving Linear Programs. A historic overview will highlight the milestones in algorithmic development and how they helped expanding the applicability of linear programming. We will discuss the benefits and weaknesses of the possible algorithms as well challenges for advancing the current state of the art for solving Linear Programs. We will cover in some more detail the dual Simplex algorithm since it is the workhorse for todays main use for solving LPs in the context of Mixed Integer Programming.

14:45–15:25 **Andrea Tramontani**, CPLEX Optimization, IBM Italy (formerly: Uni Bologna)  
*Mixed-Integer Linear Programming and CPLEX*

**Abstract:** Mixed integer programming is up today one of the most widely used techniques for dealing with hard optimization problems. On one hand, many practical optimization problems arising from real-world applications can be effectively formulated as Mixed Integer Linear Programs (MILPs). On the other hand, 50 and more years of intensive research has dramatically improved on the capability of the current generation of MILP solvers to tackle hard problem in practice. In this talk we describe the main building blocks of state of the art MILP solvers and we provide benchmark results to assess the contribution of each component to the ability to solve MILPs.

15:30–15:50 **Coffee break**

15:50–16:30 **Pierre Bonami**, CPLEX Optimization, IBM Spain (formerly: Uni Marseille)  
*Mixed-Integer Non-Linear Programming and CPLEX*

**Abstract:** Mixed integer nonlinear programming (MINLP) has been a growing topic in the research community for the last two decades. In this talk, we will review the types of mixed integer nonlinear problems that CPLEX can address. We will review the basic algorithms it employs and the most relevant choices to make regarding parameters setting. Finally, as time allows, we will offer a glimpse of current progress of CPLEX for these problems categories.

16:35–17:15 **Domenico Salvagnin**, CPLEX Optimization, IBM Italy (formerly: Uni Padova)  
*Optimization with CPLEX*

**Abstract:** In this presentation we will address two topics in practical optimization using a MIP solver. The first relates to the (many) pitfalls of performance benchmarking, and how to avoid them. The phenomenon of performance variability is also discussed in the process. The second describes how to rapidly prototype CPLEX-based solutions using the new *Python* modeling layer, DoCPLEX.

### 17:20–17:40 **Panel Discussion**

*Questions and Feedback from the User's side:  
What the audience always wanted to know about ILP-Software*

organized by:

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