Decision Support for Planning and Scheduling (DSPS)

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Constraint activities at SICS

Three groups in two labs:

- Intelligent Systems Laboratory (ISL)
  - Combinatorial Problem Solving and Prolog Technology (CPS) in Uppsala
    - SICStus, Core technology, choice of applications
  - Decision Support for Planning and Scheduling (DSPS) in Stockholm
    - Modelling, proof of concept, applications
- Distributed systems Laboratory
  - Mozart/Oz, distributed applications

Research focus of the DSPS group

Modelling and implementing prototypes of systems supporting
planning, scheduling, and resource allocation processes in industrial settings

- This generally implies solving large and/or complex industrial problems involving:
  - Scheduling
  - Resource allocation
  - Logistics
  - Network flows
  - Combinatory reasoning
  - etc...

Core technologies used

A number of techniques are used, mainly optimisation and satisfiability techniques based on:

- Constraint programming (modelling with global constraints)
- Operations research
- Local search
- Other heuristics and formal reasoning when warranted by the problem

Applications areas of particular interest

- Production planning and resource allocation problems in manufacturing industry
- Scheduling, routing and resource allocation in transportation and communication
- Time tabling for personnel and other resources in service production
- Combinatory reasoning, matching and other use of analytical methods in e.g. bio informatics and capacity planning
- Dynamic and or non monotone scheduling and resource allocation problems

Recent and/or significant projects

- TACIT
  - Trial applications of constraint technology developed in an Esprit (EU) project with partners in Sweden (SICS & OVAKO Steel), France (ProLogia & Air Liquide) and Hungary (IQsoft & Prodax)
  - Purpose: To show that constraint technology is mature enough to be applied in full scale industrial environments
  - Swedish part of consortium developed a scheduling and resource allocation tool for furnaces and rolling facilities at OVAKO's plant in Hofors
  - Concluded in 1999 but discussions around building a full scale application around our prototype still ongoing...

Projects (2)

- TUFF/ACOOR
  - Research project funded by Statens Järnvägar (SJ), Green Cargo AB, NUTEK and Vinnova from 1996 to 2001
  - Focused around a number of planning problems in the railway transportation domain
    1. Track time slot allocation (scheduling)
    2. Vehicle (engine) circuit generation
    3. Personnel rotation generation
    4. Coordination of these three subproblem

Ongoing projects

- GenFunk
- KABAN
- HEMCO
- SPOK (Prospect)

Currently seeking additional funding

Group members

- Per Kreuger (PhD) — Group leader
- Juan Alonso (PhD)
- Martin Aronsson (PhD)
- Markus Bohlin (PhD student V.ås)
- Jan Ekman (PhD)
- Waldemar Kocjan (PhD student V.ås)