

# The 5th Answer Set Programming Competition

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The 30th International Conference on Logic Programming  
Vienna, Austria

# Outline

- 1 The Fifth ASP Competition
- 2 Setup, Scoring and Benchmark Suite
- 3 Results

# The Fifth ASP Competition

## An event moved towards maturity

Departed from the usual timeline, in order to:

- be part of the Vienna Summer of Logic (VSL)
- push the standard ASP-Core-2  
(that was not satisfactorily supported by most participants)

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## Goals

- measure the progress of the state of the art
- draw a more complete picture of approaches to problems with different features
- improve benchmarks w.r.t. modeling

# The 5th Competition Setting

## Competition Setting

- Benchmarks from past editions, mainly from 2013 edition
- System competition only and modeling competition on site
- New benchmark classification based on language features
- Redesigned problem encodings
- Updated versions of the solvers, and newcomers

# System Competition Format

## Two Categories

- Single-Processor (restricted to 1-CPU Core)
- Multi-Processor (up to 8-CPU Cores)

## Tracks based on language features

Track 1 (Basic) normal LP + simple built-ins

Track 2 (Advanced) + choices, aggregates, HCF disjunction

Track 3 (Optimization) + weak constraints

Track 4 (Unrestricted) + non-HCF disjunction

# Participants - I

The competition featured 16 systems coming from three teams

- **Aalto Team**, Aalto University (9 solvers):  
LP2SAT3+GLUCOSE, LP2SAT3+LINGELING, LP2SAT3+PLINGELING-MT,  
LP2BV2+BOOLECTOR, LP2GRAPH, LP2MAXSAT+CLASP, LP2MIP2,  
LP2MIP2-MT, LP2NORMAL2+CLASP
- **Potassco Team**, University of Potsdam (2 solvers):  
CLASP, CLASP-MT
- **Wasp Team**, University of Calabria (5 solvers):  
WASP-1, WASP-2, WASP-1.5, WASP-WMSU1-ONLYWEAK,  
WASP-WPM1-ONLYWEAK

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# Setup

## System Inputs

- Fixed input in ASP-Core-2
- Solvers run with fixed settings
- 20 instances per domain, randomly selected

## System Environment

- Debian Linux server with Intel Xeon X5365 CPUs
- Time limit: 10 minutes
- Memory Limit: 6 GB
- Multi-processor track: up to 8 cores
- Performance measured using the pyrunlim tool

# Scoring

## Simplified Scoring

- Consider number of solved instances for decision problems
- Rank solvers on optimization problems by solution quality
- Runtime for tiebreaker

## Decision and Query Problems

$$\text{Score}(\text{Solver}, \text{Problem}) = \# \text{Solved}(\text{Solver}) * 5$$

## Optimization Problems

$$\text{Score}(\text{Solver}, \text{Problem}) = \sum_{\text{Instances } I} \frac{\# \text{NotBetter}(\text{Solver}, I) * 5}{\# \text{Participants}}$$

# Scoring

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## Additional Criteria

- Problems are equally weighted up to 100 points each
- Incorrect answers: disqualification on per problem basis
- Final scores by summing over all problems

# Benchmark Suite

Domain	P	2013 Encoding	2014 Encoding
<i>Labyrinth</i>	D	basic, non-tight	basic, non-tight
<i>Stable Marriage</i>	D	basic	basic
<i>Bottle Filling</i>	D	aggr	aggr, choice
<i>Graceful Graphs</i>	D	choice#	choice#
<i>Graph Colouring*</i>	D	disj	basic
<i>Hanoi Tower*</i>	D	disj	basic
<i>Incremental Scheduling</i>	D	aggr, choice#	aggr, choice#
<i>Knight Tour with Holes*</i>	D	disj, non-tight	basic, non-tight
<i>Nomystery</i>	D	aggr, choice#	choice#
<i>Partner Units</i>	D	aggr, disj, non-tight	aggr, choice
<i>Permutation Pattern Matching</i>	D	choice#	choice
<i>Qualitative Spatial Reasoning</i>	D	choice#, disj	disj
<i>Reachability</i>	Q	non-tight	n/a
<i>Ricochet Robots</i>	D	choice#	aggr, choice#
<i>Sokoban</i>	D	aggr, choice#	choice#
<i>Solitaire</i>	D	choice#	aggr, choice#
<i>Visit-all*</i>	D	aggr, choice#	basic
<i>Weighted-Sequence Problem</i>	D	choice#	aggr, choice
<i>Connected Still Life</i>	O	aggr, choice#, non-tight	aggr, choice, non-tight
<i>Crossing Minimization</i>	O	disj	aggr, choice
<i>Maximal Clique</i>	O	disj	basic
<i>Valves Location</i>	O	aggr, choice#, non-tight	aggr, choice#, non-tight
<i>Abstract Dialectical Frameworks</i>	O	aggr, disj, level, non-tight	aggr, disj, level, non-tight
<i>Complex Optimization</i>	D	choice, disj, non-tight	choice, disj, non-tight
<i>Minimal Diagnosis</i>	D	disj, non-tight	disj, non-tight
<i>Strategic Companies</i>	Q	disj, non-tight	n/a

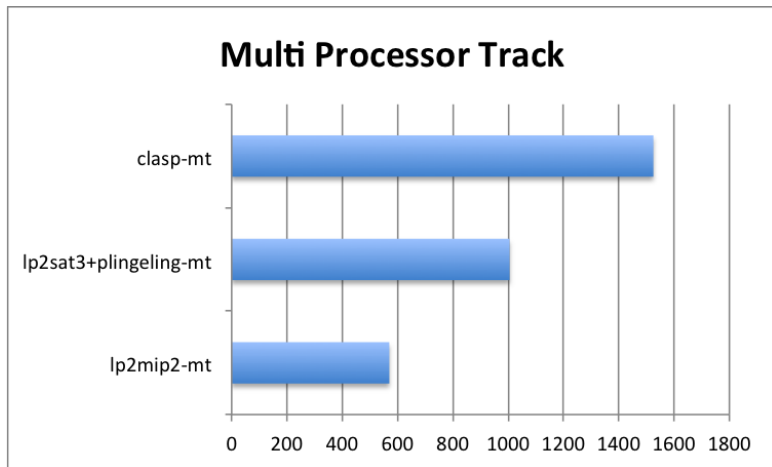
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<i>Nomystery</i>	D	aggr, choice#
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<i>Permutation Pattern Matching</i>	D	choice#
<i>Qualitative Spatial Reasoning</i>	D	choice#, disj
<i>Reachability</i>	Q	non-tight

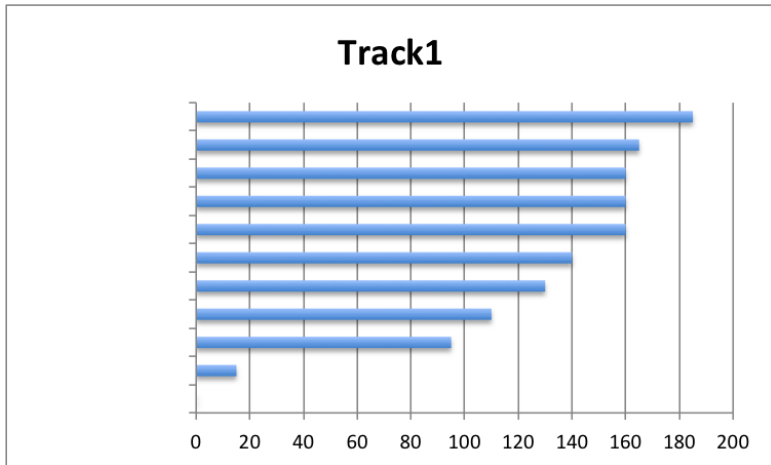
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# Results: Multi Processor Track

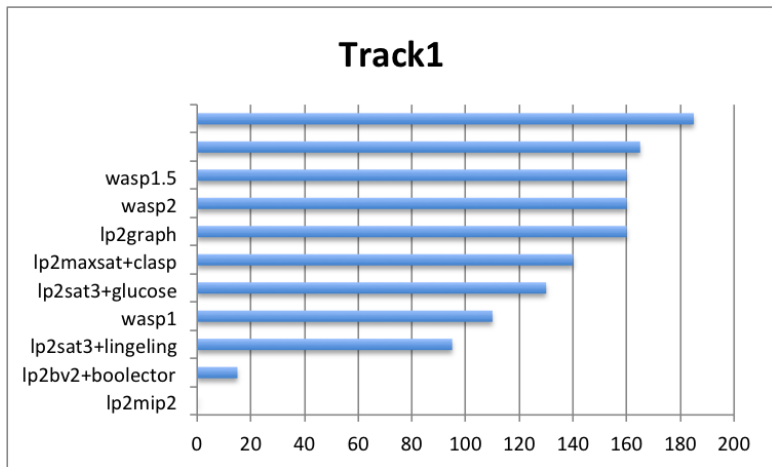


## Results: Track 1 - Basic

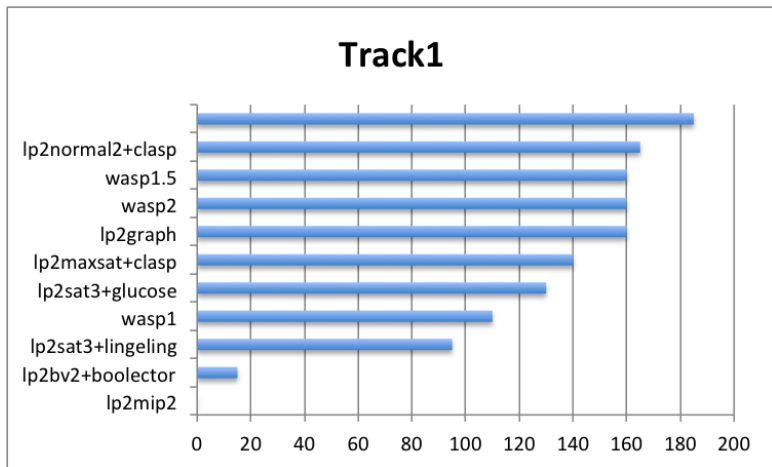




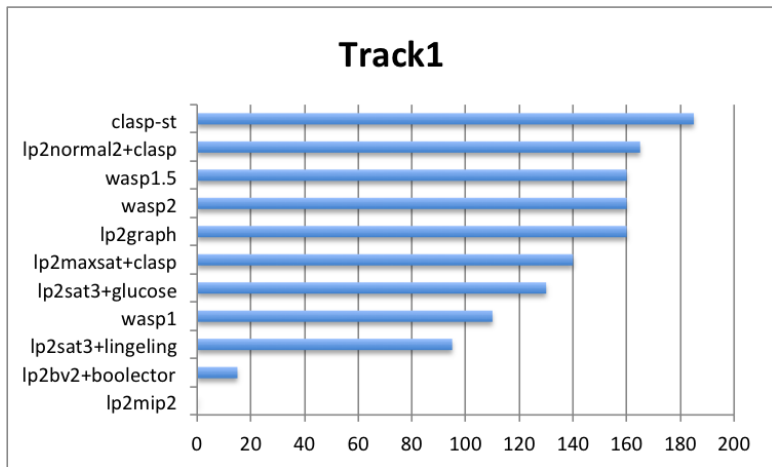
# Results: Track 1 - Basic



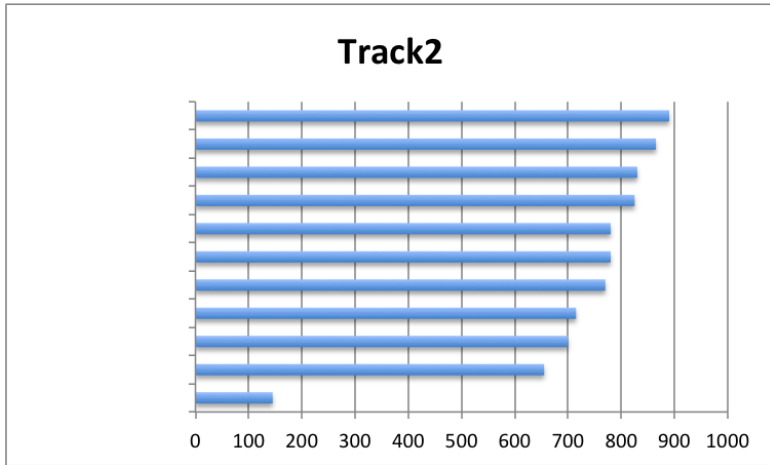
# Results: Track 1 - Basic



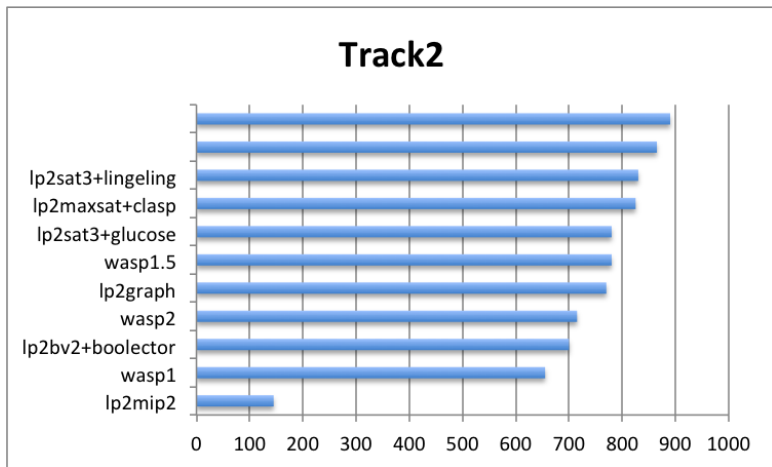
## Results: Track 1 - Basic



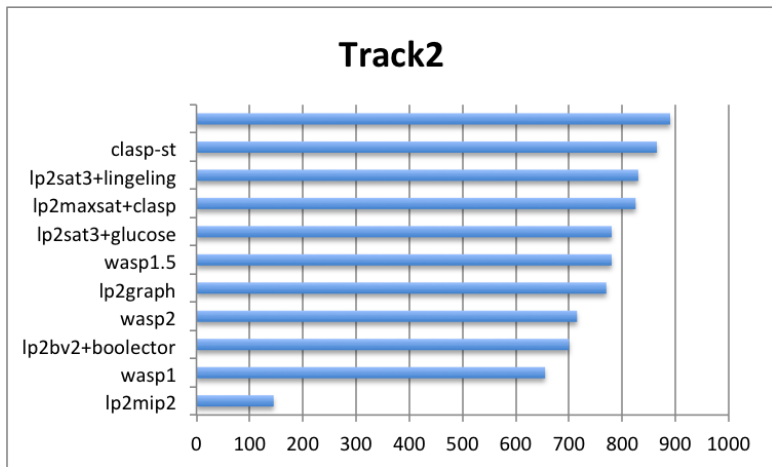
## Results: Track 2 - Advanced



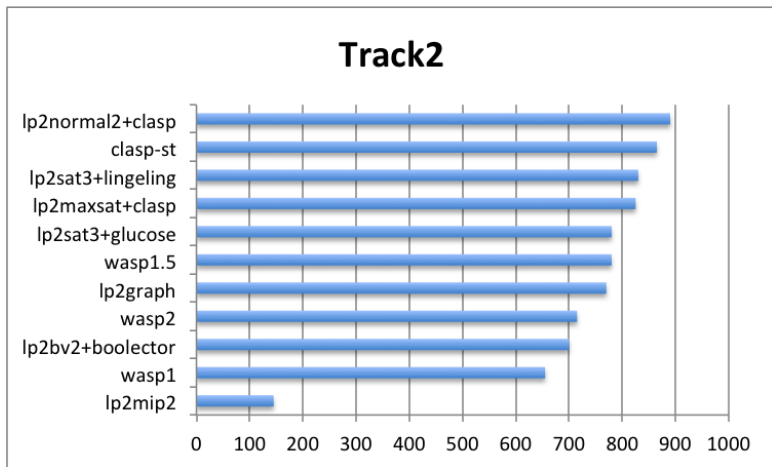
## Results: Track 2 - Advanced



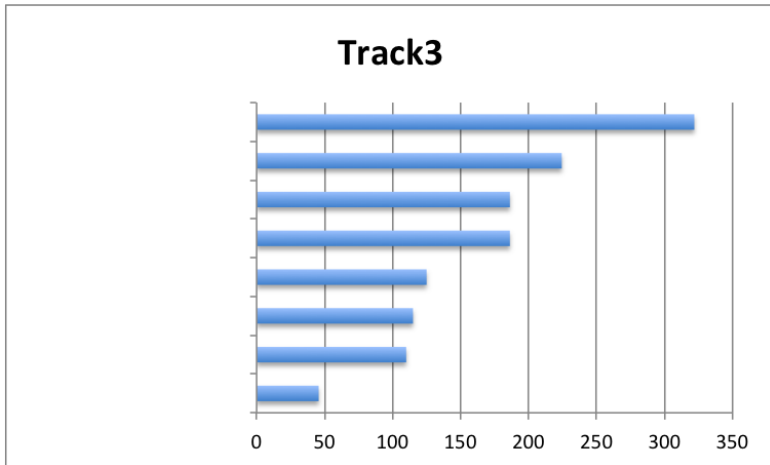
## Results: Track 2 - Advanced



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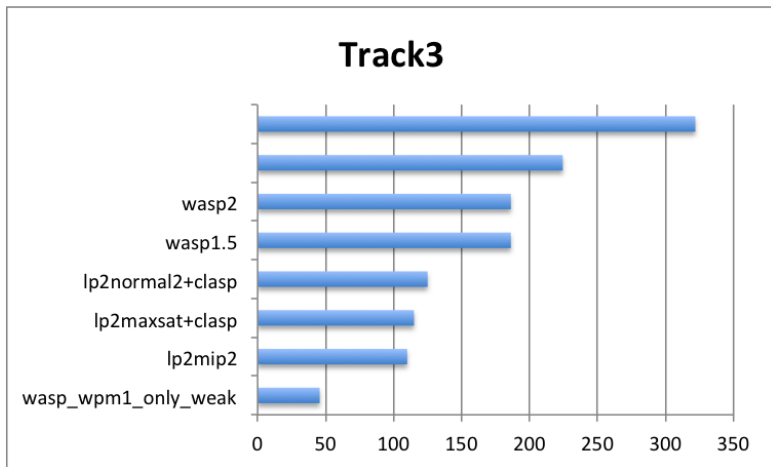


## Results: Track 3 - Optimization

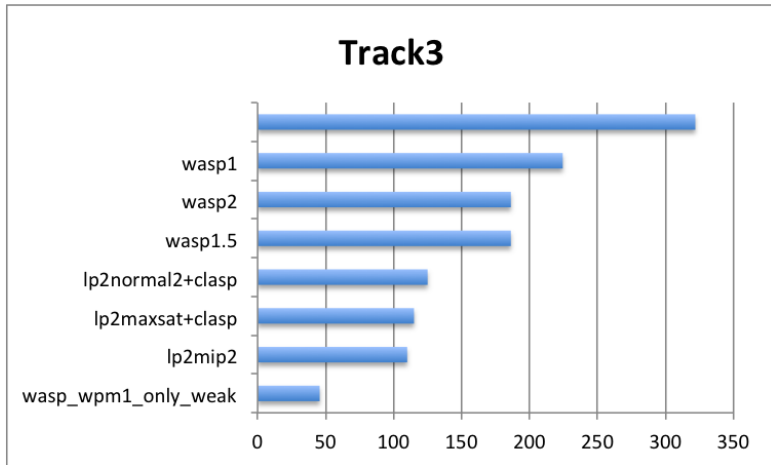




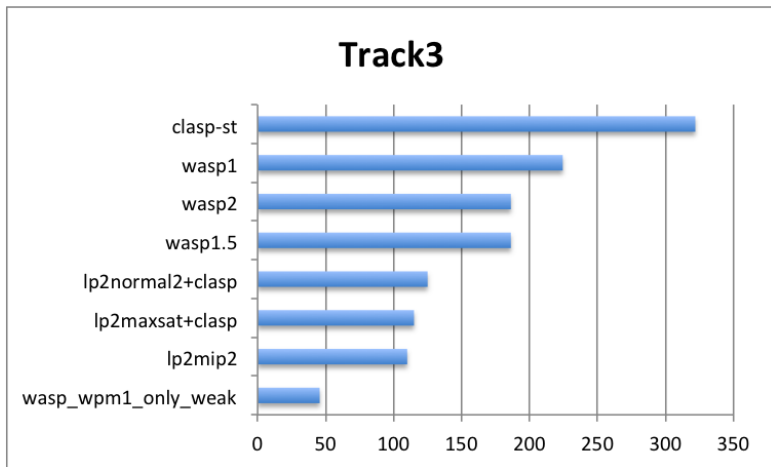
## Results: Track 3 - Optimization



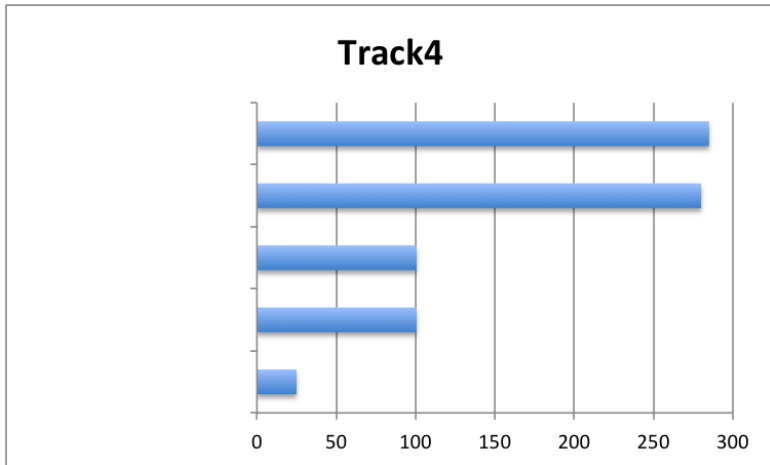
## Results: Track 3 - Optimization



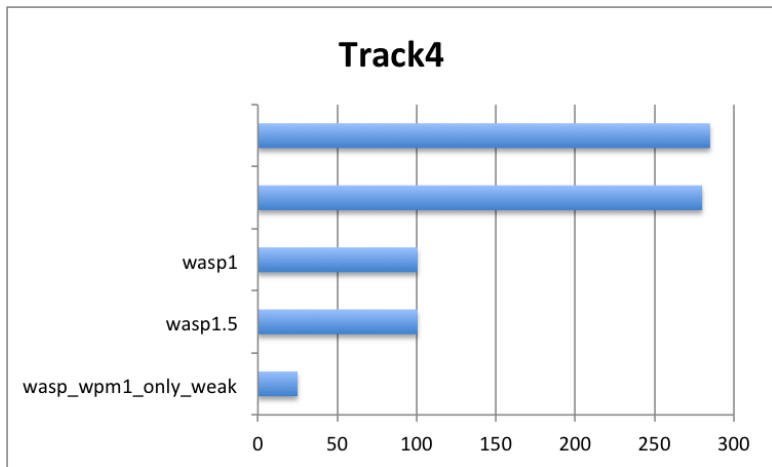
# Results: Track 3 - Optimization



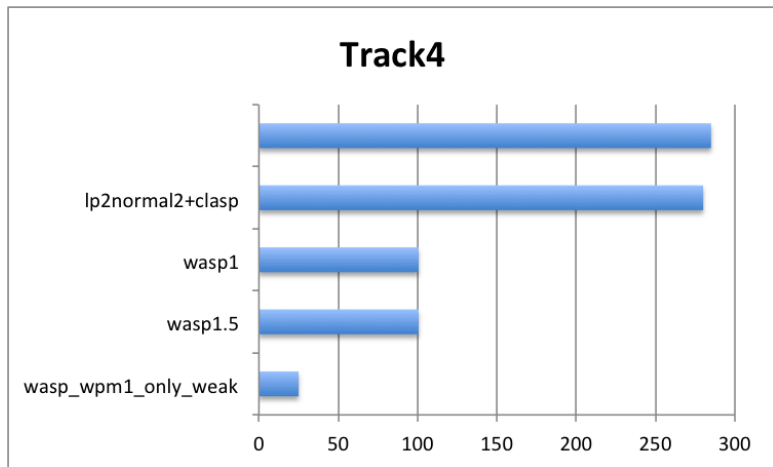
## Results: Track 4 - Unrestricted



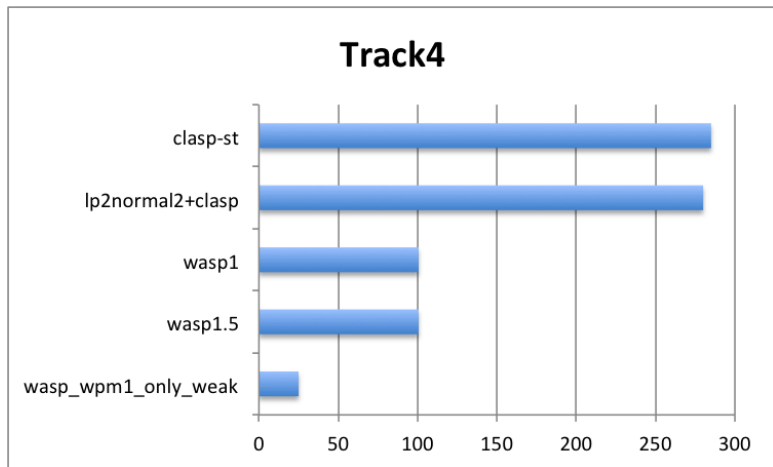
## Results: Track 4 - Unrestricted



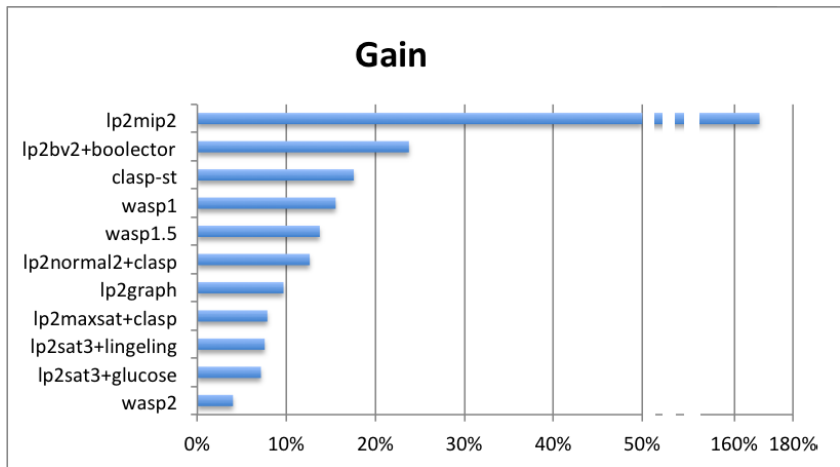
## Results: Track 4 - Unrestricted



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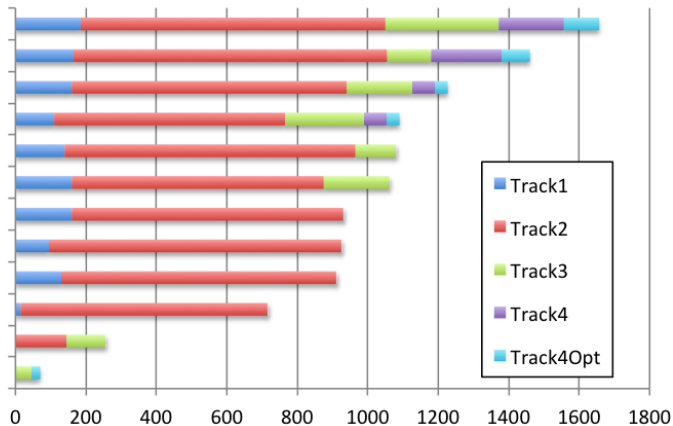


# On the impact of new encodings

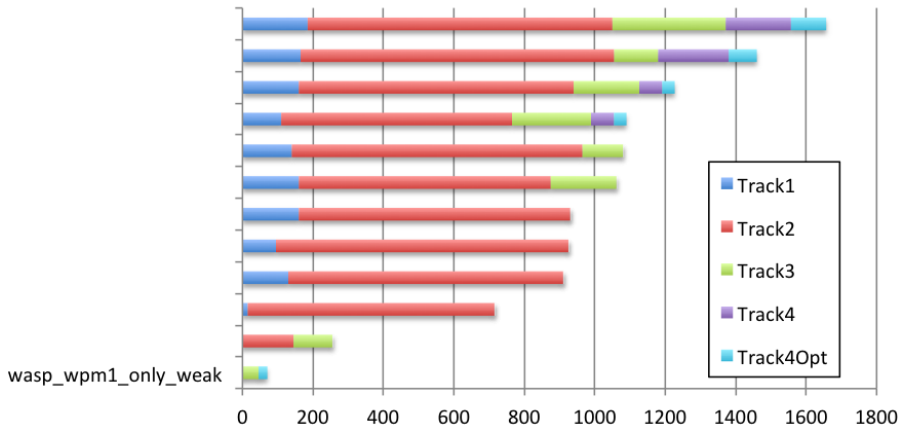




# Results: ASP Competition 2014 - Overall

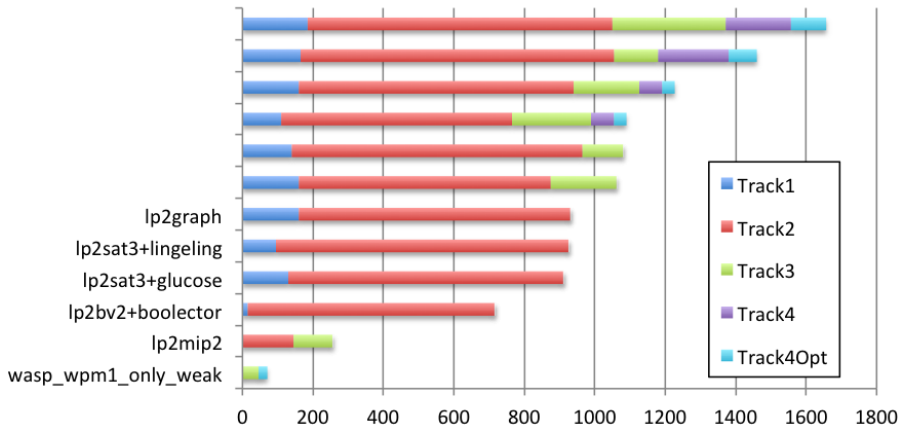


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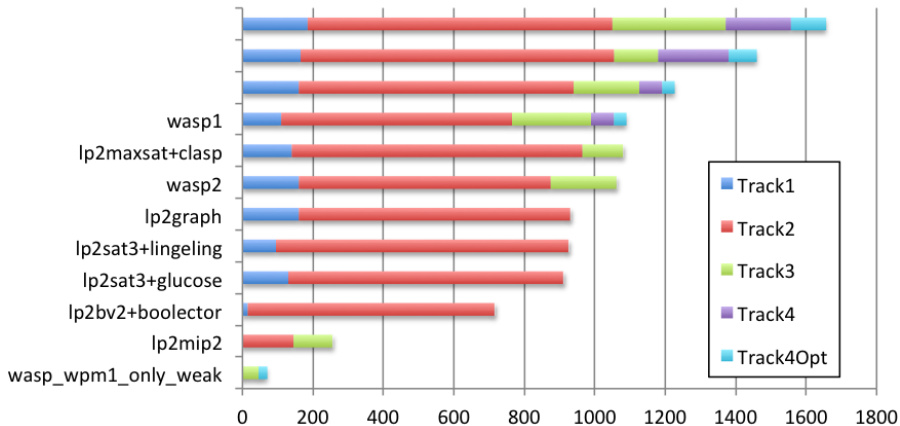




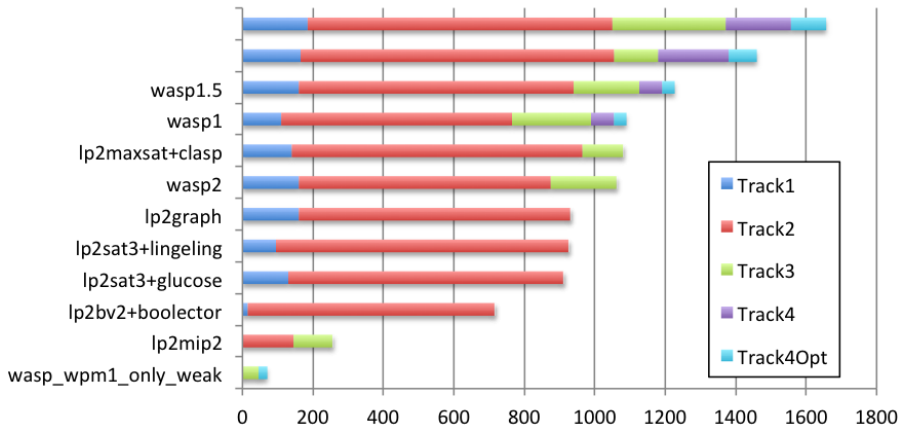
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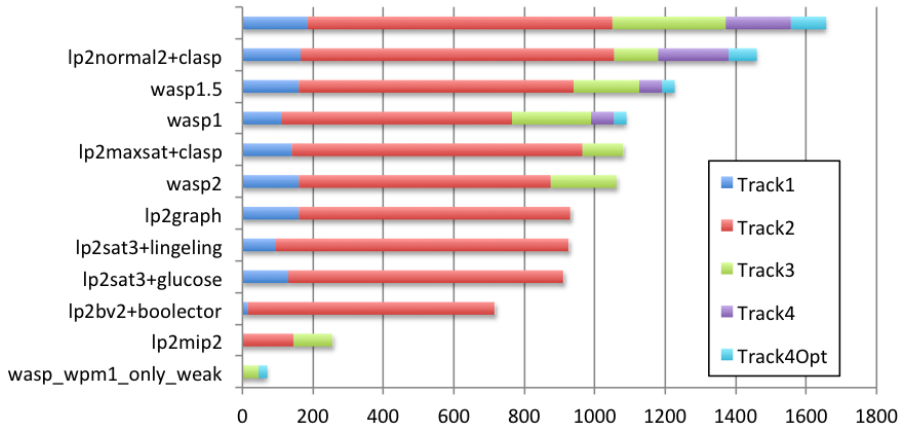
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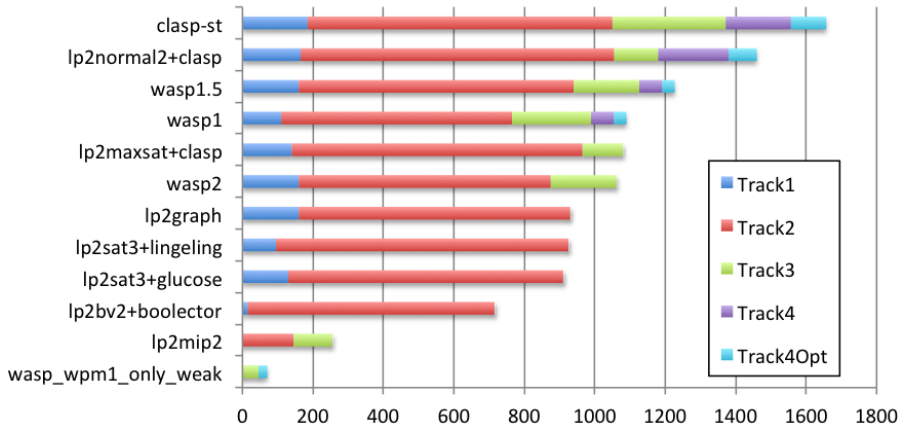
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# Suggestions for future ASP events

## Simplify Output

- Unify output for tasks
- Reduce number of exit codes

## Instance Selection

- Process for discarding very easy/hard
- More ASP-oriented real-world applications
- Enforce classification by language features
- Non-ground and ground tracks?
- Cautious/Brave Reasoning?

## Modeling Competition

- Interactive event? Challenges? ...