

# Constraint Handling Rules for SWI-Prolog

Tom Schrijvers, Bart Demoen  
K.U.Leuven

Jan Wielemaker  
University of Amsterdam, The Netherlands



# 1. SWI-Prolog

- open source Prolog system



# 1. SWI-Prolog

- open source Prolog system
- large user base (> 5,000 downloads/month)  
teaching, research, industry



# 1. SWI-Prolog

- open source Prolog system
- large user base (> 5,000 downloads/month)  
teaching, research, industry
- focus on usability
  - ◆ tools: editor, debugger, ...
  - ◆ libraries: networking, semantics web, ...



# 1. SWI-Prolog

- open source Prolog system
- large user base (> 5,000 downloads/month)  
teaching, research, industry
- focus on usability
  - ◆ tools: editor, debugger, ...
  - ◆ libraries: networking, semantics web, ...
- missing feature: **CLP support**



# 1. SWI-Prolog

- open source Prolog system
- large user base (> 5,000 downloads/month)  
teaching, research, industry
- focus on usability
  - ◆ tools: editor, debugger, ...
  - ◆ libraries: networking, semantics web, ...
- missing feature: **CLP support**  
⇒ Constraint Handling Rules



## 2. K.U.Leuven CHR System

- state-of-the-art CHR system



## 2. K.U.Leuven CHR System

- state-of-the-art CHR system
- based on reference implementation (C. Holzbaur)



## 2. K.U.Leuven CHR System

- state-of-the-art CHR system
- based on reference implementation (C. Holzbaur)
- written in hProlog (B. Demoen)



## 2. K.U.Leuven CHR System

- state-of-the-art CHR system
- based on reference implementation (C. Holzbaur)
- written in hProlog (B. Demoen)
- ported to XSB for integration with tabling



## 3. Built-ins for CHR

- attributed variables  
for propagation (co-routining)



# 3. Built-ins for CHR

- attributed variables  
for propagation (co-routining)
- global variables  
for constraint stores
  - ◆ backtrackable
  - ◆ preserving variable identity



# 3. Built-ins for CHR

- attributed variables  
for propagation (co-routining)
- global variables  
for constraint stores
  - ◆ backtrackable
  - ◆ preserving variable identity
- `setarg/3`, `term_variables/2`



# 3. Built-ins for CHR

- attributed variables for propagation (co-routining)
- global variables for constraint stores
  - ◆ backtrackable
  - ◆ preserving variable identity
- `setarg/3`, `term_variables/2`
- (large terms as arrays in efficient constraint stores)



## 4. New Features

- integration with `term_expansion/2`



## 4. New Features

- integration with `term_expansion/2`
- integration in debugger  
hides underlying generated Prolog code



## 4. New Features

- integration with `term_expansion/2`
- integration in debugger  
hides underlying generated Prolog code
- hash tables as constraint stores



## 4. New Features

- integration with `term_expansion/2`
- integration in debugger  
hides underlying generated Prolog code
- hash tables as constraint stores
- mode declarations for CHR  
(and types coming)



# 5. Related Work

- co-routining
  - ◆ dif/2
  - ◆ when/2



# 5. Related Work

- co-routining
  - ◆ dif/2
  - ◆ when/2
- small FD library



# 5. Related Work

- co-routining
  - ◆ `dif/2`
  - ◆ `when/2`
- small FD library
- port of C. Holzbaur's `clp( $\mathcal{R}$ )` (in progress)



# 6. Conclusion

- Port of CHR system easy



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required
- Allows other co-routining and constraint facilities



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required
- Allows other co-routining and constraint facilities

Future Work:

- More efficient CHR system



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required
- Allows other co-routining and constraint facilities

### Future Work:

- More efficient CHR system
- More CLP support for SWI-Prolog



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required
- Allows other co-routining and constraint facilities

### Future Work:

- More efficient CHR system
- More CLP support for SWI-Prolog
- More host languages for CHR



## 6. Conclusion

- Port of CHR system easy
- Small set of built-ins required
- Allows other co-routining and constraint facilities

### Future Work:

- More efficient CHR system
- More CLP support for SWI-Prolog
- More host languages for CHR

**2 more talks about CHR in SWI-Prolog!**

