

# SCIP

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## 1 Introduction

SCIP (**S**olving **C**onstraint **I**nteger **P**rograms) is developed at the Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB). The SCIP main developer had been Tobias Achterberg, current developers are Timo Berthold, Gerald Gamrath, Stefan Heinz, Thorsten Koch, Stefan Vigerske, Robert Waniek, Michael Winkler, and Kati Wolter. Since SCIP is distributed under the ZIB Academic License, it is only available for users with a GAMS academic license.

SCIP is a framework for Constraint Integer Programming oriented towards the needs of Mathematical Programming experts who want to have total control of the solution process and access detailed information down to the guts of the solver. SCIP can also be used as a pure MIP solver or as a framework for branch-cut-and-price. Within GAMS, the MIP and MIQCP solving facilities of SCIP are available.

For more detailed information, we refer to [1, 2, 3, 4, 5, 7] and the SCIP web site <http://scip.zib.de>.

GAMS/SCIP uses the COIN-OR linear solver CLP as LP solver and the COIN-OR Interior Point Optimizer IPOPT [6] as nonlinear solver.

## 2 Model requirements

SCIP supports continuous, binary, and integer variables, special ordered sets, and branching priorities. Semi-continuous or semi-integer variables (see chapter 17.1 of the GAMS User's Guide) and indicator constraints are not supported yet.

## 3 Usage

The following statement can be used inside your GAMS program to specify using SCIP

```
Option MIP = SCIP;      { or LP or RMIP or QCP or RMIQCP or MIQCP }
```

The above statement should appear before the Solve statement. If SCIP was specified as the default solver during GAMS installation, the above statement is not necessary.

If a continuous linear program (LP or RMIP) is given to GAMS/SCIP, the linear programming solver is called directly. In this case, it is not possible to provide an option file.

GAMS/SCIP currently does not support the GAMS Branch-and-Cut-and-Heuristic (BCH) Facility. If you need to use GAMS/SCIP with BCH, please consider to use a GAMS system of version  $\leq 23.3$ , available at [http://www.gams.com/download/download\\_old.htm](http://www.gams.com/download/download_old.htm).

### Specification of SCIP Options

GAMS/SCIP currently supports the GAMS parameters `reslim`, `iterlim`, `nodlim`, `optcr`, and `optca`.

For a MIP, QCP, or MIQCP solve the user can specify options by a SCIP options file. A SCIP options file consists of one option or comment per line. A pound sign (#) at the beginning of a line causes the entire line to be ignored. Otherwise, the line will be interpreted as an option name and value separated by an equal sign (=) and any amount of white space (blanks or tabs). Further, string values have to be enclosed in quotation marks.

A small example for a `scip.opt` file is:

```
presolving/probing/maxrounds = 0
separating/maxrounds        = 0
separating/maxroundsroot    = 0
```

It causes GAMS/SCIP to disable probing during presolve and to turn off all cut generators.

## 4 Detailed Options Description

SCIP supports a large set of options. Sample option files can be obtained from <http://www.gams.com/~svigerske/scip1.2>.

In the following we give a detailed list of SCIP options.

### GAMS interface specific options

`gams/names` (boolean) FALSE  
This option causes GAMS names for the variables and equations to be loaded into SCIP. These names will then be used for error messages, log entries, and so forth. Turning names off may help if memory is very tight.

`gams/mipstart` (boolean) TRUE  
This option controls the use of advanced starting values for mixed integer programs. A setting of TRUE indicates that the variable level values should be checked to see if they provide an integer feasible solution before starting optimization.

`gams/print_statistics` (boolean) FALSE  
This option controls the printing of solve statistics after a MIP solve. Turning on this option indicates that statistics like the number of generated cuts of each type or the calls of heuristics are printed after the MIP solve.

`gams/interactive` (boolean) FALSE  
whether a SCIP shell should be opened instead of issuing a solve command (this option is not available in demo mode)

### Branching

`branching/preferbinary` (boolean) FALSE  
should branching on binary variables be preferred?

`branching/allfullstrong/priority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) -1000  
priority of branching rule <allfullstrong>

<b>branching/allfullstrong/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <allfullstrong> should be used (-1 for no limit)	
<b>branching/allfullstrong/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/fullstrong/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	0
priority of branching rule <fullstrong>	
<b>branching/fullstrong/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <fullstrong> should be used (-1 for no limit)	
<b>branching/fullstrong/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/inference/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	1000
priority of branching rule <inference>	
<b>branching/inference/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <inference> should be used (-1 for no limit)	
<b>branching/inference/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/mostinf/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	100
priority of branching rule <mostinf>	
<b>branching/mostinf/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <mostinf> should be used (-1 for no limit)	
<b>branching/mostinf/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/leastinf/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	50
priority of branching rule <leastinf>	
<b>branching/leastinf/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <leastinf> should be used (-1 for no limit)	
<b>branching/leastinf/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/pscost/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	2000
priority of branching rule <pscost>	
<b>branching/pscost/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <pscost> should be used (-1 for no limit)	
<b>branching/pscost/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/random/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	-100000
priority of branching rule <random>	
<b>branching/random/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <random> should be used (-1 for no limit)	
<b>branching/random/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/relpscost/priority</b> ( $-536870912 \leq \text{integer} \leq 536870911$ )	10000

priority of branching rule <relpscost>	
<b>branching/relpscost/maxdepth</b> ( $-1 \leq \text{integer}$ )	-1
maximal depth level, up to which branching rule <relpscost> should be used (-1 for no limit)	
<b>branching/relpscost/maxbounddist</b> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying branching rule (0.0: only on current best node, 1.0: on all nodes)	
<b>branching/relpscost/sbiterquot</b> ( $0 \leq \text{real}$ )	0.5
maximal fraction of strong branching LP iterations compared to node relaxation LP iterations	
<b>branching/relpscost/sbiterofs</b> ( $0 \leq \text{integer}$ )	100000
additional number of allowed strong branching LP iterations	
<b>branching/relpscost/initcand</b> ( $0 \leq \text{integer}$ )	100
maximal number of candidates initialized with strong branching per node	
<b>branching/relpscost/inititer</b> ( $0 \leq \text{integer}$ )	0
iteration limit for strong branching initializations of pseudo cost entries (0: auto)	

### Conflict analysis

<b>conflict/enable</b> (boolean)	TRUE
should conflict analysis be enabled?	
<b>conflict/useprop</b> (boolean)	TRUE
should propagation conflict analysis be used?	
<b>conflict/useinflp</b> (boolean)	TRUE
should infeasible LP conflict analysis be used?	
<b>conflict/useboundlp</b> (boolean)	FALSE
should bound exceeding LP conflict analysis be used?	
<b>conflict/usesb</b> (boolean)	FALSE
should infeasible/bound exceeding strong branching conflict analysis be used?	
<b>conflict/usepseudo</b> (boolean)	TRUE
should pseudo solution conflict analysis be used?	
<b>conflict/preferbinary</b> (boolean)	FALSE
should binary conflicts be preferred?	
<b>conflict/restartnum</b> ( $0 \leq \text{integer}$ )	0
number of successful conflict analysis calls that trigger a restart (0: disable conflict restarts)	
<b>conflict/restartfac</b> ( $0 \leq \text{real}$ )	1.5
factor to increase restartnum with after each restart	

### Constraints

<b>constraints/linear/sepafreq</b> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<b>constraints/linear/propfreq</b> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<b>constraints/linear/maxrounds</b> ( $-1 \leq \text{integer}$ )	5
maximal number of separation rounds per node (-1: unlimited)	
<b>constraints/linear/maxroundsroot</b> ( $-1 \leq \text{integer}$ )	-1
maximal number of separation rounds per node in the root node (-1: unlimited)	
<b>constraints/linear/maxsepacuts</b> ( $0 \leq \text{integer}$ )	50
maximal number of cuts separated per separation round	
<b>constraints/linear/maxsepacutsroot</b> ( $0 \leq \text{integer}$ )	200
maximal number of cuts separated per separation round in the root node	

<code>constraints/linear/separateall</code> (boolean)	FALSE
should all constraints be subject to cardinality cut generation instead of only the ones with non-zero dual value?	
<code>constraints/and/sepafreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/and/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/bounddisjunction/sepafreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/bounddisjunction/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/conjunction/sepafreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/conjunction/propfreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/countsols/sepafreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/countsols/propfreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/countsols/sparsetest</code> (boolean)	TRUE
should the sparse solution test be turned on?	
<code>constraints/countsols/discardsols</code> (boolean)	TRUE
is it allowed to discard solutions?	
<code>constraints/countsols/active</code> (boolean)	FALSE
is the constraint handler active?	
<code>constraints/countsols/collect</code> (boolean)	FALSE
should the solutions be collected?	
<code>constraints/countsols/sollimit</code> ( $-1 \leq \text{integer} \leq -1$ )	-1
counting stops, if the given number of solutions were found (-1: no limit)	
<code>constraints/indicator/sepafreq</code> ( $-1 \leq \text{integer}$ )	10
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/indicator/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/integral/sepafreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/integral/propfreq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/knapsack/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/knapsack/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/linear/upgrade/knapsack</code> (boolean)	TRUE
enable linear upgrading for constraint handler <knapsack>	
<code>constraints/knapsack/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of separation rounds per node (-1: unlimited)	
<code>constraints/knapsack/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of separation rounds per node in the root node (-1: unlimited)	

<code>constraints/knapsack/maxsepacuts</code> ( $0 \leq \text{integer}$ )	50
maximal number of cuts separated per separation round	
<code>constraints/knapsack/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	200
maximal number of cuts separated per separation round in the root node	
<code>constraints/logicor/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/logicor/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/linear/upgrade/logicor</code> (boolean)	TRUE
enable linear upgrading for constraint handler <logicor>	
<code>constraints/or/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/or/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/quadratic/sepafreq</code> ( $-1 \leq \text{integer}$ )	2
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/quadratic/propfreq</code> ( $-1 \leq \text{integer}$ )	10
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/quadratic/replacesqrinary</code> (boolean)	TRUE
whether a square of a binary variables should be replaced by the binary variable	
<code>constraints/quadratic/replacebinaryprod</code> ( $0 \leq \text{integer}$ )	$\infty$
max. length of linear term which when multiplied with a binary variables is replaced by an auxiliary variable and a linear reformulation (0 to turn off)	
<code>constraints/quadratic/empathy4and</code> ( $0 \leq \text{integer} \leq 2$ )	0
empathy level for using the AND constraint handler: 0 always avoid using AND; 1 use AND sometimes; 2 use AND as often as possible	
<code>constraints/quadratic/disaggregate</code> (boolean)	TRUE
whether quadratic constraints consisting of several quadratic blocks should be disaggregated in several constraints	
<code>constraints/quadratic/minefficacy</code> ( $0 \leq \text{real}$ )	0.0001
minimal efficacy for a cut to be added to the LP; overwrites separating/efficacy	
<code>constraints/quadratic/scaling</code> (boolean)	TRUE
whether a quadratic constraint should be scaled w.r.t. the current gradient norm when checking for feasibility	
<code>constraints/quadratic/fastpropagate</code> (boolean)	TRUE
whether a propagation should be used that is faster in case of bilinear term, but also less efficient	
<code>constraints/quadratic/cutmaxrange</code> ( $0 \leq \text{real}$ )	$10^{10}$
maximal range of a cut (maximal coefficient divided by minimal coefficient) in order to be added to LP relaxation	
<code>constraints/quadratic/linearizenlpsol</code> (boolean)	TRUE
whether convex quadratic constraints should be linearized in a solution found by the NLP or RENSNN heuristic	
<code>constraints/quadratic/strategy</code> (character)	r
strategy to use for selecting branching variable: b: rb-int-br, r: rb-int-br-rev, i: rb-inf	
<code>constraints/quadratic/mindistbrpointtobound</code> ( $0.0001 \leq \text{real} \leq 0.5$ )	0.2
minimal fractional distance of branching point to variable bounds; a value of 0.5 leads to branching always in the middle of a bounded domain	
<code>constraints/setppc/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/setppc/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	

<code>constraints/linear/upgrade/setppc</code> (boolean)	TRUE
enable linear upgrading for constraint handler <setppc>	
<code>constraints/SOS1/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/SOS1/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/SOS1/branchSOS</code> (boolean)	TRUE
Use SOS1 branching in enforcing (otherwise leave decision to branching rules)?	
<code>constraints/SOS1/branchNonzeros</code> (boolean)	FALSE
Branch on SOS constraint with most number of nonzeros?	
<code>constraints/SOS1/branchWeight</code> (boolean)	FALSE
Branch on SOS cons. with highest nonzero-variable weight for branching (needs <code>branchNonzeros = false</code> )?	
<code>constraints/SOS2/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/SOS2/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/varbound/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/varbound/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	
<code>constraints/linear/upgrade/varbound</code> (boolean)	TRUE
enable linear upgrading for constraint handler <varbound>	
<code>constraints/xor/sepafreq</code> ( $-1 \leq \text{integer}$ )	0
frequency for separating cuts (-1: never, 0: only in root node)	
<code>constraints/xor/propfreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for propagating domains (-1: never, 0: only in root node)	

**Output**

<code>display/verblevel</code> ( $0 \leq \text{integer} \leq 5$ )	4
verbosity level of output	
<code>display/width</code> ( $0 \leq \text{integer}$ )	80
maximal number of characters in a node information line	
<code>display/freq</code> ( $-1 \leq \text{integer}$ )	100
frequency for displaying node information lines	
<code>display/headerfreq</code> ( $-1 \leq \text{integer}$ )	15
frequency for displaying header lines (every n'th node information line)	
<code>display/lpinfo</code> (boolean)	FALSE
should the LP solver display status messages?	
<code>display/sols/active</code> ( $0 \leq \text{integer} \leq 2$ )	0
display activation status of display column <sols> (0: off, 1: auto, 2:on)	
<code>display/feasST/active</code> ( $0 \leq \text{integer} \leq 2$ )	0
display activation status of display column <feasST> (0: off, 1: auto, 2:on)	
<code>display/solfound/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <solfound> (0: off, 1: auto, 2:on)	
<code>display/time/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <time> (0: off, 1: auto, 2:on)	
<code>display/nnodes/active</code> ( $0 \leq \text{integer} \leq 2$ )	1

display activation status of display column <nnodes> (0: off, 1: auto, 2:on)	
<code>display/nodesleft/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <nodesleft> (0: off, 1: auto, 2:on)	
<code>display/lpiterations/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <lpiterations> (0: off, 1: auto, 2:on)	
<code>display/memused/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <memused> (0: off, 1: auto, 2:on)	
<code>display/depth/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <depth> (0: off, 1: auto, 2:on)	
<code>display/maxdepth/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <maxdepth> (0: off, 1: auto, 2:on)	
<code>display/plungedepth/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <plungedepth> (0: off, 1: auto, 2:on)	
<code>display/nfrac/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <nfrac> (0: off, 1: auto, 2:on)	
<code>display/vars/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <vars> (0: off, 1: auto, 2:on)	
<code>display/conss/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <conss> (0: off, 1: auto, 2:on)	
<code>display/curconss/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <curconss> (0: off, 1: auto, 2:on)	
<code>display/curcols/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <curcols> (0: off, 1: auto, 2:on)	
<code>display/currows/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <currows> (0: off, 1: auto, 2:on)	
<code>display/cuts/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <cuts> (0: off, 1: auto, 2:on)	
<code>display/separounds/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <separounds> (0: off, 1: auto, 2:on)	
<code>display/poolsize/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <poolsize> (0: off, 1: auto, 2:on)	
<code>display/conflicts/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <conflicts> (0: off, 1: auto, 2:on)	
<code>display/strongbranches/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <strongbranches> (0: off, 1: auto, 2:on)	
<code>display/lpobj/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <lpobj> (0: off, 1: auto, 2:on)	
<code>display/curdualbound/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <curdualbound> (0: off, 1: auto, 2:on)	
<code>display/estimate/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <estimate> (0: off, 1: auto, 2:on)	
<code>display/avgdualbound/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <avgdualbound> (0: off, 1: auto, 2:on)	
<code>display/dualbound/active</code> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <dualbound> (0: off, 1: auto, 2:on)	
<code>display/primalbound/active</code> ( $0 \leq \text{integer} \leq 2$ )	1

display activation status of display column <primalbound> (0: off, 1: auto, 2:on)	
<b>display/cutoffbound/active</b> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <cutoffbound> (0: off, 1: auto, 2:on)	
<b>display/gap/active</b> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <gap> (0: off, 1: auto, 2:on)	
<b>display/nsols/active</b> ( $0 \leq \text{integer} \leq 2$ )	1
display activation status of display column <nsols> (0: off, 1: auto, 2:on)	
<b>Heuristics</b>	
<b>heuristics/actconsdiving/freq</b> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <actconsdiving> (-1: never, 0: only at depth freqofs)	
<b>heuristics/actconsdiving/freqofs</b> ( $0 \leq \text{integer}$ )	5
frequency offset for calling primal heuristic <actconsdiving>	
<b>heuristics/actconsdiving/maxlpiterquot</b> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<b>heuristics/actconsdiving/maxlpiterofs</b> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<b>heuristics/actconsdiving/backtrack</b> (boolean)	TRUE
use one level of backtracking if infeasibility is encountered?	
<b>heuristics/coefdiving/freq</b> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <coefdiving> (-1: never, 0: only at depth freqofs)	
<b>heuristics/coefdiving/freqofs</b> ( $0 \leq \text{integer}$ )	1
frequency offset for calling primal heuristic <coefdiving>	
<b>heuristics/coefdiving/maxlpiterquot</b> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<b>heuristics/coefdiving/maxlpiterofs</b> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<b>heuristics/coefdiving/backtrack</b> (boolean)	TRUE
use one level of backtracking if infeasibility is encountered?	
<b>heuristics/crossover/freq</b> ( $-1 \leq \text{integer}$ )	30
frequency for calling primal heuristic <crossover> (-1: never, 0: only at depth freqofs)	
<b>heuristics/crossover/freqofs</b> ( $0 \leq \text{integer}$ )	10
frequency offset for calling primal heuristic <crossover>	
<b>heuristics/crossover/nodesofs</b> ( $0 \leq \text{integer} \leq -1$ )	500
number of nodes added to the contingent of the total nodes	
<b>heuristics/crossover/nusedsols</b> ( $2 \leq \text{integer}$ )	3
number of solutions to be taken into account	
<b>heuristics/crossover/nodesquot</b> ( $0 \leq \text{real} \leq 1$ )	0.1
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<b>heuristics/crossover/minfixingrate</b> ( $0 \leq \text{real} \leq 1$ )	0.666
minimum percentage of integer variables that have to be fixed	
<b>heuristics/dins/freq</b> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <dins> (-1: never, 0: only at depth freqofs)	
<b>heuristics/dins/freqofs</b> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <dins>	
<b>heuristics/dins/nodesofs</b> ( $0 \leq \text{integer} \leq -1$ )	5000
number of nodes added to the contingent of the total nodes	

<code>heuristics/dins/nodesquot</code> ( $0 \leq \text{real} \leq 1$ )	0.05
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<code>heuristics/dins/minnodes</code> ( $0 \leq \text{integer} \leq -1$ )	500
minimum number of nodes required to start the subproblem	
<code>heuristics/dins/solnum</code> ( $1 \leq \text{integer}$ )	5
number of pool-solutions to be checked for flag array update (for hard fixing of binary variables)	
<code>heuristics/dins/neighborhoodsize</code> ( $1 \leq \text{integer}$ )	18
radius (using Manhattan metric) of the incumbent's neighborhood to be searched	
<code>heuristics/feaspump/freq</code> ( $-1 \leq \text{integer}$ )	20
frequency for calling primal heuristic <code>&lt;feaspump&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/feaspump/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;feaspump&gt;</code>	
<code>heuristics/feaspump/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.01
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/feaspump/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/feaspump/objfactor</code> ( $0 \leq \text{real} \leq 1$ )	1
factor by which the regard of the objective is decreased in each round, 1.0 for dynamic	
<code>heuristics/feaspump/beforecuts</code> (boolean)	TRUE
should the feasibility pump be called at root node before cut separation?	
<code>heuristics/fixandinfer/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <code>&lt;fixandinfer&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/fixandinfer/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;fixandinfer&gt;</code>	
<code>heuristics/fracdiving/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <code>&lt;fracdiving&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/fracdiving/freqofs</code> ( $0 \leq \text{integer}$ )	3
frequency offset for calling primal heuristic <code>&lt;fracdiving&gt;</code>	
<code>heuristics/fracdiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/fracdiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/fracdiving/backtrack</code> (boolean)	TRUE
use one level of backtracking if infeasibility is encountered?	
<code>heuristics/guideddiving/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <code>&lt;guideddiving&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/guideddiving/freqofs</code> ( $0 \leq \text{integer}$ )	7
frequency offset for calling primal heuristic <code>&lt;guideddiving&gt;</code>	
<code>heuristics/guideddiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/guideddiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/guideddiving/backtrack</code> (boolean)	TRUE
use one level of backtracking if infeasibility is encountered?	
<code>heuristics/intdiving/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <code>&lt;intdiving&gt;</code> (-1: never, 0: only at depth freqofs)	

<code>heuristics/intdiving/freqofs</code> ( $0 \leq \text{integer}$ )	9
frequency offset for calling primal heuristic <intdiving>	
<code>heuristics/intdiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/intdiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/intdiving/backtrack</code> ( <code>boolean</code> )	TRUE
use one level of backtracking if infeasibility is encountered?	
<code>heuristics/intshifting/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <intshifting> (-1: never, 0: only at depth freqofs)	
<code>heuristics/intshifting/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <intshifting>	
<code>heuristics/linesearchdiving/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <linesearchdiving> (-1: never, 0: only at depth freqofs)	
<code>heuristics/linesearchdiving/freqofs</code> ( $0 \leq \text{integer}$ )	6
frequency offset for calling primal heuristic <linesearchdiving>	
<code>heuristics/linesearchdiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/linesearchdiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/linesearchdiving/backtrack</code> ( <code>boolean</code> )	TRUE
use one level of backtracking if infeasibility is encountered?	
<code>heuristics/localbranching/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <localbranching> (-1: never, 0: only at depth freqofs)	
<code>heuristics/localbranching/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <localbranching>	
<code>heuristics/localbranching/nodesofs</code> ( $0 \leq \text{integer}$ )	1000
number of nodes added to the contingent of the total nodes	
<code>heuristics/localbranching/neighborhoodsize</code> ( $1 \leq \text{integer}$ )	18
radius (using Manhattan metric) of the incumbent's neighborhood to be searched	
<code>heuristics/localbranching/nodesquot</code> ( $0 \leq \text{real} \leq 1$ )	0.05
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<code>heuristics/mutation/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <mutation> (-1: never, 0: only at depth freqofs)	
<code>heuristics/mutation/freqofs</code> ( $0 \leq \text{integer}$ )	8
frequency offset for calling primal heuristic <mutation>	
<code>heuristics/mutation/nodesofs</code> ( $0 \leq \text{integer}$ )	500
number of nodes added to the contingent of the total nodes	
<code>heuristics/mutation/nodesquot</code> ( $0 \leq \text{real} \leq 1$ )	0.1
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<code>heuristics/mutation/minfixingrate</code> ( $10^{-6} \leq \text{real} \leq 0.999999$ )	0.8
percentage of integer variables that have to be fixed	
<code>heuristics/nlp/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <nlp> (-1: never, 0: only at depth freqofs)	
<code>heuristics/nlp/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <nlp>	

<code>heuristics/nlp/nlpverblevel</code> ( $0 \leq \text{integer} \leq 2$ )	0
verbosity level of NLP solver	
<code>heuristics/nlp/nlpiterlimit</code> ( $0 \leq \text{integer}$ )	0
iteration limit of NLP solver; 0 to use solver default	
<code>heuristics/nlp/nlptimelimit</code> ( $0 \leq \text{real}$ )	0
time limit of NLP solver; 0 to use solver default	
<code>heuristics/nlp/resolvetolfactor</code> ( $0 \leq \text{real} \leq 1$ )	0.01
if SCIP does not accept a solution which the NLP solver thinks is feasible, the feasibility tolerance is reduced by this factor and the NLP resolved (set to 1. to turn off resolve)	
<code>heuristics/nlp/resolvefromscratch</code> (boolean)	TRUE
whether a resolve of an NLP due to disagreement of feasibility should be from the original starting point or the infeasible solution	
<code>heuristics/nlp/iteroffset</code> ( $0 \leq \text{integer}$ )	500
number of iterations added to the contingent of the total number of iterations	
<code>heuristics/nlp/iterquotient</code> ( $0 \leq \text{real}$ )	0.1
contingent of NLP iterations in relation to the number of nodes in SCIP	
<code>heuristics/nlp/itermin</code> ( $0 \leq \text{integer}$ )	300
contingent of NLP iterations in relation to the number of nodes in SCIP	
<code>heuristics/nlp/varboundexplicit</code> (boolean)	TRUE
whether variable bound constraints should be handled explicitly before solving NLP instead of adding them to the NLP	
<code>heuristics/objpscostdiving/freq</code> ( $-1 \leq \text{integer}$ )	20
frequency for calling primal heuristic <objpscostdiving> (-1: never, 0: only at depth freqofs)	
<code>heuristics/objpscostdiving/freqofs</code> ( $0 \leq \text{integer}$ )	4
frequency offset for calling primal heuristic <objpscostdiving>	
<code>heuristics/objpscostdiving/maxlpiterquot</code> ( $0 \leq \text{real} \leq 1$ )	0.01
maximal fraction of diving LP iterations compared to total iteration number	
<code>heuristics/objpscostdiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/octane/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <octane> (-1: never, 0: only at depth freqofs)	
<code>heuristics/octane/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <octane>	
<code>heuristics/oneopt/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling primal heuristic <oneopt> (-1: never, 0: only at depth freqofs)	
<code>heuristics/oneopt/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <oneopt>	
<code>heuristics/pscostdiving/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <pscostdiving> (-1: never, 0: only at depth freqofs)	
<code>heuristics/pscostdiving/freqofs</code> ( $0 \leq \text{integer}$ )	2
frequency offset for calling primal heuristic <pscostdiving>	
<code>heuristics/pscostdiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/pscostdiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/pscostdiving/backtrack</code> (boolean)	TRUE
use one level of backtracking if infeasibility is encountered?	

<code>heuristics/rens/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling primal heuristic <code>&lt;rens&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/rens/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;rens&gt;</code>	
<code>heuristics/rens/minfixingrate</code> ( $0 \leq \text{real} \leq 1$ )	0.5
minimum percentage of integer variables that have to be fixable	
<code>heuristics/rens/nodesofs</code> ( $0 \leq \text{integer} \leq -1$ )	500
number of nodes added to the contingent of the total nodes	
<code>heuristics/rens/nodesquot</code> ( $0 \leq \text{real} \leq 1$ )	0.1
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<code>heuristics/rins/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling primal heuristic <code>&lt;rins&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/rins/freqofs</code> ( $0 \leq \text{integer}$ )	5
frequency offset for calling primal heuristic <code>&lt;rins&gt;</code>	
<code>heuristics/rins/nodesofs</code> ( $0 \leq \text{integer}$ )	500
number of nodes added to the contingent of the total nodes	
<code>heuristics/rins/nodesquot</code> ( $0 \leq \text{real} \leq 1$ )	0.1
contingent of sub problem nodes in relation to the number of nodes of the original problem	
<code>heuristics/rins/minfixingrate</code> ( $0 \leq \text{real} \leq 1$ )	0
minimum percentage of integer variables that have to be fixed	
<code>heuristics/rootsoldiving/freq</code> ( $-1 \leq \text{integer}$ )	20
frequency for calling primal heuristic <code>&lt;rootsoldiving&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/rootsoldiving/freqofs</code> ( $0 \leq \text{integer}$ )	5
frequency offset for calling primal heuristic <code>&lt;rootsoldiving&gt;</code>	
<code>heuristics/rootsoldiving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.01
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/rootsoldiving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/rounding/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling primal heuristic <code>&lt;rounding&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/rounding/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;rounding&gt;</code>	
<code>heuristics/shifting/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <code>&lt;shifting&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/shifting/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;shifting&gt;</code>	
<code>heuristics/simplerounding/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling primal heuristic <code>&lt;simplerounding&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/simplerounding/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;simplerounding&gt;</code>	
<code>heuristics/trivial/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling primal heuristic <code>&lt;trivial&gt;</code> (-1: never, 0: only at depth freqofs)	
<code>heuristics/trivial/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;trivial&gt;</code>	
<code>heuristics/trysol/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling primal heuristic <code>&lt;trysol&gt;</code> (-1: never, 0: only at depth freqofs)	

<code>heuristics/trysol/freqofs</code> ( $0 \leq \text{integer}$ )	0
frequency offset for calling primal heuristic <code>&lt;trysol&gt;</code>	
<code>heuristics/veclen diving/freq</code> ( $-1 \leq \text{integer}$ )	10
frequency for calling primal heuristic <code>&lt;veclen diving&gt;</code> (-1: never, 0: only at depth <code>freqofs</code> )	
<code>heuristics/veclen diving/freqofs</code> ( $0 \leq \text{integer}$ )	4
frequency offset for calling primal heuristic <code>&lt;veclen diving&gt;</code>	
<code>heuristics/veclen diving/maxlpiterquot</code> ( $0 \leq \text{real}$ )	0.05
maximal fraction of diving LP iterations compared to node LP iterations	
<code>heuristics/veclen diving/maxlpiterofs</code> ( $0 \leq \text{integer}$ )	1000
additional number of allowed LP iterations	
<code>heuristics/veclen diving/backtrack</code> ( <code>boolean</code> )	TRUE
use one level of backtracking if infeasibility is encountered?	

### Limits

<code>limits/time</code> ( $0 \leq \text{real}$ )	1000
maximal time in seconds to run	
<code>limits/nodes</code> ( $-1 \leq \text{integer} \leq -1$ )	-1
maximal number of nodes to process (-1: no limit)	
<code>limits/stallnodes</code> ( $-1 \leq \text{integer} \leq -1$ )	-1
solving stops, if the given number of nodes was processed since the last improvement of the primal solution value (-1: no limit)	
<code>limits/memory</code> ( $0 \leq \text{real}$ )	$\infty$
maximal memory usage in MB; reported memory usage is lower than real memory usage!	
<code>limits/gap</code> ( $0 \leq \text{real}$ )	0.1
solving stops, if the relative gap = $-(\text{primalbound} - \text{dualbound})/\text{dualbound}$ — is below the given value	
<code>limits/abs gap</code> ( $0 \leq \text{real}$ )	0
solving stops, if the absolute gap = $ \text{primalbound} - \text{dualbound} $ — is below the given value	
<code>limits/solutions</code> ( $-1 \leq \text{integer}$ )	-1
solving stops, if the given number of solutions were found (-1: no limit)	
<code>limits/bestsol</code> ( $-1 \leq \text{integer}$ )	-1
solving stops, if the given number of solution improvements were found (-1: no limit)	
<code>limits/maxsol</code> ( $1 \leq \text{integer}$ )	100
maximal number of solutions to store in the solution storage	

### LP

<code>lp/solvefreq</code> ( $-1 \leq \text{integer}$ )	1
frequency for solving LP at the nodes (-1: never; 0: only root LP)	
<code>lp/solvedepth</code> ( $-1 \leq \text{integer}$ )	-1
maximal depth for solving LP at the nodes (-1: no depth limit)	
<code>lp/initalgorithm</code> ( <code>character</code> )	s
LP algorithm for solving initial LP relaxations (automatic 's'implex, 'p'rimal simplex, 'd'ual simplex, 'b'arrier, barrier with 'c'rossover)	
<code>lp/resolvealgorithm</code> ( <code>character</code> )	s
LP algorithm for resolving LP relaxations if a starting basis exists (automatic 's'implex, 'p'rimal simplex, 'd'ual simplex, 'b'arrier, barrier with 'c'rossover)	
<code>lp/pricing</code> ( <code>character</code> )	1
LP pricing strategy ('l'pi default, 'a'uto, 'f'ull pricing, 'p'artial, 's'teepest edge pricing, 'q'uickstart steepest edge pricing, 'd'evex pricing)	

**Memory**

`memory/savefac` ( $0 \leq \text{real} \leq 1$ ) 0.8  
fraction of maximal memory usage resulting in switch to memory saving mode

**Micellaneous**

`misc/catchctrlc` (boolean) TRUE  
should the CTRL-C interrupt be caught by SCIP?

**Node Selection**

`nodeselection/childsel` (character) h  
child selection rule ('d'own, 'u'p, 'p'seudo costs, 'i'nference, 'l'p value, 'r'oot LP value difference, 'h'brid inference/root LP value difference)

`nodeselection/bfs/stdpriority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) 100000  
priority of node selection rule <bfs> in standard mode

`nodeselection/dfs/stdpriority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) 0  
priority of node selection rule <dfs> in standard mode

`nodeselection/estimate/stdpriority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) 200000  
priority of node selection rule <estimate> in standard mode

`nodeselection/estimate/bestnodefreq` ( $0 \leq \text{integer}$ ) 10  
frequency at which the best node instead of the best estimate is selected (0: never)

`nodeselection/hybridestim/stdpriority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) 50000  
priority of node selection rule <hybridestim> in standard mode

`nodeselection/hybridestim/bestnodefreq` ( $0 \leq \text{integer}$ ) 1000  
frequency at which the best node instead of the hybrid best estimate / best bound is selected (0: never)

`nodeselection/restartdfs/stdpriority` ( $-536870912 \leq \text{integer} \leq 536870911$ ) 10000  
priority of node selection rule <restartdfs> in standard mode

`nodeselection/restartdfs/selectbestfreq` ( $0 \leq \text{integer}$ ) 1000  
frequency for selecting the best node instead of the deepest one (0: never)

**Tolerances**

`numerics/epsilon` ( $10^{-20} \leq \text{real} \leq 0.001$ )  $10^{-9}$   
absolute values smaller than this are considered zero

`numerics/sumepsilon` ( $10^{-17} \leq \text{real} \leq 0.001$ )  $10^{-6}$   
absolute values of sums smaller than this are considered zero

`numerics/feastol` ( $10^{-17} \leq \text{real} \leq 0.001$ )  $10^{-6}$   
LP feasibility tolerance for constraints

`numerics/dualfeastol` ( $10^{-17} \leq \text{real} \leq 0.001$ )  $10^{-9}$   
LP feasibility tolerance for reduced costs

**Presolving**

`presolving/maxrounds` ( $-1 \leq \text{integer}$ ) -1  
maximal number of presolving rounds (-1: unlimited)

`presolving/maxrestarts` ( $-1 \leq \text{integer}$ ) -1  
maximal number of restarts (-1: unlimited)

`presolving/boundshift/maxrounds` ( $-1 \leq \text{integer}$ ) 0  
maximal number of presolving rounds the presolver participates in (-1: no limit)

`presolving/dualfix/maxrounds` ( $-1 \leq \text{integer}$ ) -1  
maximal number of presolving rounds the presolver participates in (-1: no limit)

`presolving/implics/maxrounds` ( $-1 \leq \text{integer}$ ) -1

maximal number of presolving rounds the presolver participates in (-1: no limit)	
<code>presolving/inttobinary/maxrounds</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of presolving rounds the presolver participates in (-1: no limit)	
<code>presolving/probing/maxrounds</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of presolving rounds the presolver participates in (-1: no limit)	
<code>presolving/probing/maxruns</code> ( $-1 \leq \text{integer}$ )	1
maximal number of runs, probing participates in (-1: no limit)	
<code>presolving/trivial/maxrounds</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of presolving rounds the presolver participates in (-1: no limit)	

### Domain Propagation

<code>propagating/maxrounds</code> ( $-1 \leq \text{integer}$ )	100
maximal number of propagation rounds per node (-1: unlimited)	
<code>propagating/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	1000
maximal number of propagation rounds in the root node (-1: unlimited)	
<code>propagating/abortoncutoff</code> (boolean)	TRUE
should propagation be aborted immediately? setting this to FALSE could help conflict analysis to produce more conflict constraints	
<code>propagating/pseudoobj/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling propagator <pseudoobj> (-1: never, 0: only in root node)	
<code>propagating/rootredcost/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling propagator <rootredcost> (-1: never, 0: only in root node)	

### Separation

<code>separating/maxbounddist</code> ( $0 \leq \text{real} \leq 1$ )	1
maximal relative distance from current node's dual bound to primal bound compared to best node's dual bound for applying separation (0.0: only on current best node, 1.0: on all nodes)	
<code>separating/minefficacy</code> ( $0 \leq \text{real}$ )	0.05
minimal efficacy for a cut to enter the LP	
<code>separating/minefficacyroot</code> ( $0 \leq \text{real}$ )	0.01
minimal efficacy for a cut to enter the LP in the root node	
<code>separating/minortho</code> ( $0 \leq \text{real} \leq 1$ )	0.5
minimal orthogonality for a cut to enter the LP	
<code>separating/minorthoroot</code> ( $0 \leq \text{real} \leq 1$ )	0.5
minimal orthogonality for a cut to enter the LP in the root node	
<code>separating/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of separation rounds per node (-1: unlimited)	
<code>separating/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of separation rounds in the root node (-1: unlimited)	
<code>separating/maxstallrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of consecutive separation rounds without objective or integrality improvement (-1: no additional restriction)	
<code>separating/maxcuts</code> ( $0 \leq \text{integer}$ )	100
maximal number of cuts separated per separation round (0: disable local separation)	
<code>separating/maxcutsroot</code> ( $0 \leq \text{integer}$ )	2000
maximal number of separated cuts at the root node (0: disable root node separation)	
<code>separating/poolfreq</code> ( $-1 \leq \text{integer}$ )	0
separation frequency for the global cut pool (-1: disable global cut pool, 0: only separate pool at the root)	

<code>separating/cliq/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <cliq> (-1: never, 0: only in root node)	
<code>separating/cliq/maxsepacuts</code> ( $-1 \leq \text{integer}$ )	10
maximal number of cliq cuts separated per separation round (-1: no limit)	
<code>separating/cmirt/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <cmirt> (-1: never, 0: only in root node)	
<code>separating/cmirt/maxrounds</code> ( $-1 \leq \text{integer}$ )	3
maximal number of cmirt separation rounds per node (-1: unlimited)	
<code>separating/cmirt/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	10
maximal number of cmirt separation rounds in the root node (-1: unlimited)	
<code>separating/cmirt/maxsepacuts</code> ( $0 \leq \text{integer}$ )	100
maximal number of cmirt cuts separated per separation round	
<code>separating/cmirt/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	500
maximal number of cmirt cuts separated per separation round in the root node	
<code>separating/cmirt/dynamiccuts</code> ( <code>boolean</code> )	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/flowcover/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <flowcover> (-1: never, 0: only in root node)	
<code>separating/flowcover/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of separation rounds per node (-1: unlimited)	
<code>separating/flowcover/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	10
maximal number of separation rounds in the root node (-1: unlimited)	
<code>separating/flowcover/maxsepacuts</code> ( $0 \leq \text{integer}$ )	100
maximal number of flow cover cuts separated per separation round	
<code>separating/flowcover/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	200
maximal number of flow cover cuts separated per separation round in the root	
<code>separating/flowcover/dynamiccuts</code> ( <code>boolean</code> )	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/gomory/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <gomory> (-1: never, 0: only in root node)	
<code>separating/gomory/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of gomory separation rounds per node (-1: unlimited)	
<code>separating/gomory/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	-1
maximal number of gomory separation rounds in the root node (-1: unlimited)	
<code>separating/gomory/maxsepacuts</code> ( $0 \leq \text{integer}$ )	50
maximal number of gomory cuts separated per separation round	
<code>separating/gomory/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	500
maximal number of gomory cuts separated per separation round in the root node	
<code>separating/gomory/dynamiccuts</code> ( <code>boolean</code> )	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/impliedbounds/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <impliedbounds> (-1: never, 0: only in root node)	
<code>separating/intobj/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling separator <intobj> (-1: never, 0: only in root node)	
<code>separating/mcf/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <mcf> (-1: never, 0: only in root node)	

<code>separating/mcf/dynamiccuts</code> (boolean)	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/mcf/maxsepacuts</code> ( $-1 \leq \text{integer}$ )	100
maximal number of mcf cuts separated per separation round	
<code>separating/mcf/maxsepacutsroot</code> ( $-1 \leq \text{integer}$ )	200
maximal number of mcf cuts separated per separation round in the root node – default separation	
<code>separating/redcost/freq</code> ( $-1 \leq \text{integer}$ )	1
frequency for calling separator <code>&lt;redcost&gt;</code> (-1: never, 0: only in root node)	
<code>separating/redcost/continuous</code> (boolean)	FALSE
should reduced cost fixing be also applied to continuous variables?	
<code>separating/strongcg/freq</code> ( $-1 \leq \text{integer}$ )	0
frequency for calling separator <code>&lt;strongcg&gt;</code> (-1: never, 0: only in root node)	
<code>separating/strongcg/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of strong CG separation rounds per node (-1: unlimited)	
<code>separating/strongcg/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	20
maximal number of strong CG separation rounds in the root node (-1: unlimited)	
<code>separating/strongcg/maxsepacuts</code> ( $0 \leq \text{integer}$ )	50
maximal number of strong CG cuts separated per separation round	
<code>separating/strongcg/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	500
maximal number of strong CG cuts separated per separation round in the root node	
<code>separating/strongcg/dynamiccuts</code> (boolean)	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/zerohalf/freq</code> ( $-1 \leq \text{integer}$ )	-1
frequency for calling separator <code>&lt;zerohalf&gt;</code> (-1: never, 0: only in root node)	
<code>separating/zerohalf/maxrounds</code> ( $-1 \leq \text{integer}$ )	5
maximal number of zerohalf separation rounds per node (-1: unlimited)	
<code>separating/zerohalf/maxroundsroot</code> ( $-1 \leq \text{integer}$ )	10
maximal number of zerohalf separation rounds in the root node (-1: unlimited)	
<code>separating/zerohalf/maxsepacuts</code> ( $0 \leq \text{integer}$ )	50
maximal number of 0,1/2-cuts separated per separation round	
<code>separating/zerohalf/maxsepacutsroot</code> ( $0 \leq \text{integer}$ )	500
maximal number of 0,1/2-cuts separated per separation round in the root node	
<code>separating/zerohalf/dynamiccuts</code> (boolean)	TRUE
should generated cuts be removed from the LP if they are no longer tight?	
<code>separating/zerohalf/preprocessing/decomposeproblem</code> (boolean)	FALSE
should problem be decomposed into subproblems (if possible) before applying preprocessing?	
<code>separating/zerohalf/preprocessing/delta</code> ( $0 \leq \text{real} \leq 1$ )	0.5
value of delta parameter used in preprocessing method 'd'	
<code>separating/zerohalf/preprocessing/ppmethods</code> (string)	CXRGXIM
preprocessing methods and ordering:	
# 'd' columns with small LP solution,	
# 'G' modified Gaussian elimination,	
# 'i' identical columns,	
# 'I' identical rows,	
# 'L' large slack rows,	
# 'M' large slack rows (minslack),	
# 's' column singletons,	
# 'X' add trivial zerohalf cuts,	

```

# 'z' zero columns,
# 'Z' zero rows,
# 'C' fast 'z','s',
# 'R' fast 'Z','L','I'
#
# '-' no preprocessing

separating/zerohalf/separating/forcecutstolp (boolean) FALSE
should the cuts be forced to enter the LP?

separating/zerohalf/separating/forcecutstosepastore (boolean) FALSE
should the cuts be forced to enter SCIP's sepastore?

separating/zerohalf/separating/minviolation (0.001 ≤ real ≤ 0.5) 0.3
minimal violation of a 0,1/2-cut to be separated

separating/zerohalf/separating/sepamethods (string) 2g
separating methods and ordering:
# '!' stop further processing if a cut was found,
# '2' exact polynomial time algorithm (only if matrix has max 2 odd entries per row),
# 'e' enumeration heuristics (k=1: try all preprocessed rows),
# 'E' enumeration heuristics (k=2: try all combinations of up to two preprocessed rows),
# 'g' Extended Gaussian elimination heuristics,
# 's' auxiliary IP heuristics (i.e. number of solved nodes is limited)
# 'S' auxiliary IP exact (i.e. unlimited number of nodes)
#
# '-' no processing

separating/zerohalf/separating/auxip/settingsfile (string) -
optional settings file of the auxiliary IP (-: none)

separating/zerohalf/separating/auxip/sollimit (-1 ≤ integer) -1
limits/solutions setting of the auxiliary IP

separating/zerohalf/separating/auxip/penaltyfactor (0 ≤ real ≤ 1) 0.001
penalty factor used with objective function 'p' of auxiliary IP

separating/zerohalf/separating/auxip/useallsols (boolean) TRUE
should all (proper) solutions of the auxiliary IP be used to generate cuts instead of using only the best?

separating/zerohalf/separating/auxip/objective (character) v
auxiliary IP objective:
# 'v' maximize cut violation,
# 'u' minimize number of aggregated rows in cut,
# 'w' minimize number of aggregated rows in cut
# weighted by the number of rows in the aggregation,
# 'p' maximize cut violation and penalize a high number
# of aggregated rows in the cut weighted by the number
# of rows in the aggregation and the penalty factor p

Timing

timing/clocktype (1 ≤ integer ≤ 2) 1
default clock type (1: CPU user seconds, 2: wall clock time)

timing/enabled (boolean) TRUE
is timing enabled?

```

# SCIP References

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- [4] Timo Berthold. Primal heuristics for mixed integer programs. Diploma thesis, Technische Universität Berlin, 2006.
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- [6] Andreas Wächter and Lorenz T. Biegler. On the implementation of a primal-dual interior point filter line search algorithm for large-scale nonlinear programming. *Mathematical Programming*, 106(1):25–57, 2006. <http://projects.coin-or.org/Ipopt>.
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