

# The Rglpk Package

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**Title** R/GNU Linear Programming Kit Interface

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**Description** R interface to the GNU Linear Programming Kit (GLPK version 4.33). GLPK is open source software for solving large-scale linear programming (LP), mixed integer linear programming (MILP) and other related problems.

**Depends** R (>= 2.7.0)

**License** GPL-2

**URL** <http://R-Forge.R-project.org/projects/rglp/>, <http://www.gnu.org/software/glpk/>

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Rglpk\_read\_file     *Interface to GLPK's file reader*

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### Description

High level R interface to the MPS and CPLEX\_LP reader of the GNU Linear Programming Kit (GLPK).

### Usage

```
## MPS file reader
Rglpk_read_file(file, type = c("MPS_fixed", "MPS_free", "CPLEX_LP"),
  ignore_first_row = FALSE, verbose = FALSE)

## print method
## S3 method for class 'MP_data_from_file':
print(x, ...)
```

### Arguments

file	a character specifying the relative or absolute path to the model file.
type	a character specifying the file format. This can be either "MPS_fixed", "MPS_free" and "CPLEX_LP".
ignore_first_row	a logical indicating whether the first row of the model file should be ignored or not. Default: FALSE.
verbose	a logical for turning on/off additional solver output. Default: FALSE.
x	an object of class "MP_data_from_file".
...	further arguments passed on to the print method.

### Details

Rglpk\_read\_file() takes the path to a file as an argument and calls GLPK's file reader. The description of the linear or mixed integer linear program is returned as an object of class "MP\_data\_from\_file".

### Value

Rglpk\_read\_file() returns the specification of a mixed integer linear program defined in file as an object of class "MP\_data\_from\_file".

### Author(s)

Stefan Theussl

**Examples**

```
## not run:
## x <- Rglpk_read_file(some_file.MPS)
## x
## Rglpk_solve_LP(x$objective, x$constraints[[1]], x$constraints[[2]],
##               x$constraints[[3]], x$types, x$maximum, x$bounds)
```

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Rglpk\_solve\_LP

*Linear and Mixed Integer Programming Solver Using GLPK*


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**Description**

High level R interface to the GNU Linear Programming Kit for solving linear as well as mixed integer linear programming problems (MILPs).

**Usage**

```
Rglpk_solve_LP(obj, mat, dir, rhs, types = NULL, max = FALSE,
               bounds = NULL, verbose = FALSE)
```

**Arguments**

obj	a vector with the objective coefficients
mat	a vector or a matrix of the constraint coefficients
dir	a character vector with the directions of the constraints. Each element must be one of "<", "<=", ">", ">=", or "==".
rhs	the right hand side of the constraints
types	a vector indicating the types of the objective variables. types can be either "B" for binary, "C" for continuous or "I" for integer. By default all variables are of type "C".
max	a logical giving the direction of the optimization. TRUE means that the objective is to maximize the objective function, FALSE (default) means to minimize it.
bounds	NULL (default) or a list with elements upper and lower containing the indices and corresponding bounds of the objective variables. The default for each variable is a bound between 0 and Inf.
verbose	a logical for turning on/off additional solver output: Default: FALSE.

**Details**

The GNU Linear Programming Kit is open source. The current version can be found at <http://www.gnu.org/software/glpk/glpk.html>. Package **Rglpk** provides a high level solver function using the low level C interface of the GLPK solver. There also exists an R interface done by Lopaka Lee which ports all low level C Interface routines of the GLPK API to R (R package **glpk**).

**Value**

A list containing the optimal solution, with the following components.

solution	the vector of optimal coefficients
objval	the value of the objective function at the optimum
status	an integer with status information about the solution returned: 0 if the optimal solution was found, a non-zero value otherwise.

**Author(s)**

Stefan Theussl and Kurt Hornik

**References**

GNU Linear Programming Kit (<http://www.gnu.org/software/glpk/glpk.html>).  
 GLPK Interface to R (<http://cran.R-project.org/package=Rglpk>).

**See Also**

`lp` in package **lpSolve**; `Rsymphony_solve_LP` in package **Rsymphony**.

**Examples**

```
## Simple linear program.
## maximize:  2 x_1 + 4 x_2 + 3 x_3
## subject to: 3 x_1 + 4 x_2 + 2 x_3 <= 60
##            2 x_1 +   x_2 +   x_3 <= 40
##            x_1 + 3 x_2 + 2 x_3 <= 80
##            x_1, x_2, x_3 are non-negative real numbers

obj <- c(2, 4, 3)
mat <- matrix(c(3, 2, 1, 4, 1, 3, 2, 2, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(60, 40, 80)
max <- TRUE

Rglpk_solve_LP(obj, mat, dir, rhs, max = max)

## Simple mixed integer linear program.
## maximize:   3 x_1 + 1 x_2 + 3 x_3
## subject to: -1 x_1 + 2 x_2 +   x_3 <= 4
##            4 x_2 - 3 x_3 <= 2
##            x_1 - 3 x_2 + 2 x_3 <= 3
##            x_1, x_3 are non-negative integers
##            x_2 is a non-negative real number

obj <- c(3, 1, 3)
mat <- matrix(c(-1, 0, 1, 2, 4, -3, 1, -3, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(4, 2, 3)
types <- c("I", "C", "I")
```

```
max <- TRUE

Rglpk_solve_LP(obj, mat, dir, rhs, types, max)

## Same as before but with bounds replaced by
## -Inf < x_1 <= 4
## 0 <= x_2 <= 100
## 2 <= x_3 < Inf

bounds <- list(lower = list(ind = c(1L, 3L), val = c(-Inf, 2)),
               upper = list(ind = c(1L, 2L), val = c(4, 100)))
Rglpk_solve_LP(obj, mat, dir, rhs, types, max, bounds)
```

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