

# Package ‘tsdb’

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**Type** Package

**Title** Terribly-Simple Data Base for Time Series

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**Description** A terribly-simple data base for numeric time series, written purely in R, so no external database-software is needed. Series are stored in plain-text files (the most-portable and enduring file type) in CSV format. Timestamps are encoded using R's native numeric representation for 'Date'/'POSIXct', which makes them fast to parse, but keeps them accessible with other software. The package provides tools for saving and updating series in this standardised format, for retrieving and joining data, for summarising files and directories, and for coercing series from and to other data types (such as 'zoo' series).

**License** GPL-3

**Imports** datetimeutils, fastmatch, utils, zoo

**Suggests** data.table, tinytest

**URL** <http://enricoschumann.net/R/packages/tsdb/>,  
<https://github.com/enricoschumann/tsdb>,  
<https://gitlab.com/enricoschumann/tsdb>

**NeedsCompilation** no

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tsdb-package	<i>Terribly-Simple Database for Time Series</i>
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### Description

A terribly-simple data base for numeric time series, written purely in R, so no external database-software is needed. Series are stored in plain-text files (the most-portable and enduring file type) in CSV format; timestamps are encoded using R's native numeric representation for `Date/POSIXct`, which makes them fast to parse, but keeps them accessible with other software. The package provides tools for saving and updating series in this standardised format, for retrieving and joining data, for summarising files and directories, and for coercing series from and to other data types (such as 'zoo' series).

### Details

See the functions `ts_table` and `as.ts_table` for creating a `ts_table`.

See `write_ts_table` and `read_ts_tables` for storing and loading a `ts_table` (or several).

For getting started, see the tutorial at <https://gitlab.com/enricoschumann/tsdb/blob/master/README.org> or <https://github.com/enricoschumann/tsdb/blob/master/README.org>.

### Author(s)

Enrico Schumann

### See Also

`ts_table` and `as.ts_table` for creating a `ts_table`

`write_ts_table` and `read_ts_tables` for storing and loading a `ts_table`

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as.ts_table	<i>Coerce to ts_table</i>
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## Description

Coerce objects to `ts_table`

## Usage

```
as.ts_table(x, ...)
```

```
## S3 method for class 'zoo'  
as.ts_table(x, columns, ...)
```

## Arguments

x	object to be coerced to <code>ts_table</code>
columns	character
...	arguments to be passed to other methods

## Details

A generic function for coercing objects to class `ts_table`.

## Value

a `ts_table`

## Author(s)

Enrico Schumann

## See Also

[read\\_ts\\_tables](#)

## Examples

```
library("zoo")  
as.ts_table(zoo(1:5, Sys.Date()-5:1), ## note that the "columns"  
            columns = "value")      ## must be specified
```

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`file_info`*Information about Data File*

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**Description**

Provides information about data stored in file: columns, number of observations, range of timestamps.

**Usage**

```
file_info(dir, file)
```

**Arguments**

<code>dir</code>	character
<code>file</code>	character

**Details**

Provide information, such as number of entries, of specified files.

It is recommended that code that uses the returned information to alter or write tables, should explicitly check whether a table exists (column exists in the returned `data.frame`). For instance, a value of `NA` for `min.timestamp` would occur for a non-existing file, but also if the file could not be read for some reason.

**Value**

An object of type `file_info`, which is a `data.frame` with information such as whether a file exists, minimum and maximum timestamp, and more.

**Author(s)**

Enrico Schumann

**See Also**

[ts\\_table](#)

**Examples**

```
ts <- ts_table(1:3, as.Date("2018-12-3") + 1:3, columns = "A")
d <- tempdir()
write_ts_table(ts, file = "temp", dir = d)
file_info(d, "temp")
```

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read_ts_tables	<i>Read Time-Series Data from Files</i>
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### Description

Read time-series data from files and merge them.

### Usage

```
read_ts_tables(file, dir, t.type = "guess",
              start, end, columns,
              return.class = NULL,
              drop.weekends = FALSE,
              column.names = "%dir%/%file%:%column%",
              backend = "csv",
              read.fn = NULL,
              frequency = "1 sec",
              timestamp)
```

### Arguments

file	character
dir	character
t.type	character: guess, Date or POSIXct
start	a timestamp: either of classes <a href="#">Date</a> or <a href="#">POSIXct</a> (possibly including timezone information), or a character string. Strings are passed to <a href="#">as.Date/as.POSIXct</a> . Note in particular that a string of the form "YYYY-MM-DD HH:MM:SS", when passed to <a href="#">as.POSIXct</a> , will be interpreted as a datetime in the current timezone. It is best to always specify start: if start is missing, the function will use the first timestamp of the first time-series it reads.
end	a timestamp: either of classes <a href="#">Date</a> or <a href="#">POSIXct</a> (possibly including timezone information), or a character string. Strings are passed to <a href="#">as.Date/as.POSIXct</a> . Note in particular that a string of the form "YYYY-MM-DD HH:MM:SS", when passed to <a href="#">as.POSIXct</a> , will be interpreted as a datetime in the current timezone. It is best to always specify end: if end is missing, the function will use the current time (which may not be appropriate: for instance, when forecasts are stored).
columns	character.
return.class	NULL (default) or character: if NULL, a list is returned. Also supported are <a href="#">zoo</a> , <a href="#">data.frame</a> and <a href="#">ts_table</a> .
drop.weekends	logical
column.names	character: a format string for column names; may contain %dir%, %file%, and %column%. It is only used when return.class is data.frame or zoo.
backend	character: currently, only 'csv' is fully supported

read.fn	NULL or character: use 'fread' to use <a href="#">fread</a> from package <b>data.table</b>
frequency	character: only used when t.type is POSIXct (or guessed to be POSIXct)
timestamp	a vector of timestamps: if specified, only data at the times in timestamp are selected

## Details

Read time-series data from CSV files.

## Value

When return.class is NULL, a list:

data	a numeric matrix
timestamp	Date or POSIXct
columns	character
file.path	character

## Author(s)

Enrico Schumann

## See Also

[write\\_ts\\_table](#)

## Examples

```
t1 <- ts_table(1:3, as.Date("2018-12-3") + 1:3, columns = "A")
t2 <- ts_table(4:5, as.Date("2018-12-3") + 1:2, columns = "A")

d <- tempdir() ## this is just an example.
## Actual (valuable) data should never
## be stored in a tempdir!

write_ts_table(t1, dir = d, file = "t1")
write_ts_table(t2, dir = d, file = "t2")

read_ts_tables(c("t1", "t2"),
  dir = d, columns = "A",
  return.class = "zoo",
  column.names = "%file%.%column%")
```

---

ts_table	<i>Create ts_table</i>
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---

## Description

Create a `ts_table`.

## Usage

```
ts_table(data, timestamp, columns)
```

## Arguments

data	numeric
timestamp	<a href="#">Date</a> or <a href="#">POSIXct</a>
columns	column names

## Details

Create a time-series table (`ts_table`). A `ts_table` is a numeric matrix, so there is always a `dim` attribute. For a `ts_table` `x`, you get the number of observations with `dim(x)[1L]`.

Attached to this matrix are several attributes:

**timestamp** a vector: the numeric representation of the timestamp

**t.type** character: the class of the original timestamp, either `Date` or `POSIXct`

**columns** a character vector that provides the columns names

There may be other attributes as well, but these three are always present.

Timestamps must be of class `Date` or `POSIXct` (`POSIXlt` is converted). A `tzone` attribute is dropped.

A `ts_table` is not meant as a time-series class. For most computations (plotting, calculation of statistics, etc.), the `ts_table` must first be coerced to `zoo`, `xts`, a `data.frame` or a similar data structure. Methods that perform such coercions are responsible for converting the numeric timestamp vector to an actual timestamp. For this, they may use the function `ttime` ('translate time').

## Value

a `ts_table`

## Author(s)

Enrico Schumann

## See Also

[as.ts\\_table](#)

**Examples**

```
ts_table(1:5, Sys.Date() - 5:1, columns = "value")
```

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ttime	<i>Translate Timestamps</i>
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---

**Description**

Translate a vector of timestamps.

**Usage**

```
ttime(x, from = "datetime", to = "numeric", tz = "",  
      strip.attr = TRUE, format = "%Y-%m-%d")
```

**Arguments**

x	numeric
from	character: datetime, numeric or character
to	character: numeric, Date or POSIXct
tz	character
strip.attr	logical: strip attributes; in particular, timezone information
format	character

**Details**

ttime ('translate time') converts timestamps between formats.

**Author(s)**

Enrico Schumann

**See Also**

[ts\\_table](#)

**Examples**

```
ttime(Sys.Date())  
ttime(17397, from = "numeric", to = "Date")
```



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write_ts_table	<i>Write Time-Series Data to File</i>
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---

**Description**

Write time-series data to files.

**Usage**

```
write_ts_table(ts, dir, file, add = FALSE, overwrite = FALSE,  
              replace.file = FALSE, backend = "csv")
```

**Arguments**

ts	a ts_table
dir	character
file	character
add	logical: if TRUE, add data with timestamps that are not in a file.
overwrite	logical: overwrite existing file when data differs. overwrite implies add.
replace.file	logical: if TRUE, an existing file is deleted and replaced by a new file (i.e. containing ts)
backend	character: currently, csv and monetdb are supported

**Details**

The function takes a ts\_table and writes it to a file.

If the file already exists and both add and overwrite are FALSE (the default), nothing is written.

When add is TRUE, the function checks if ts contains timestamps not yet in the file and, if there are any, writes only those data.

When overwrite is TRUE, the function merges all observations in the file with those in ts and writes the result back to the file. If ts contains timestamps that were already in the file, the data in the file are overwritten. Note that no data will be removed from the file: timestamps not in ts remain unchanged in the file.

**Value**

Invisibly, the number of data rows written to a file.

**Author(s)**

Enrico Schumann

**See Also**

[read\\_ts\\_tables](#)

**Examples**

```
t1 <- ts_table(1:3, as.Date("2018-12-3") + 1:3, columns = "A")
t2 <- ts_table(4:5, as.Date("2018-12-3") + 1:2, columns = "A")

d <- tempdir() ## this is just an example.
               ## Actual (valuable) data should never
               ## be stored in a tempdir!

write_ts_table(t1, dir = d, file = "t1")
write_ts_table(t2, dir = d, file = "t2")

read_ts_tables(c("t1", "t2"),
               dir = d, columns = "A",
               return.class = "zoo",
               column.names = "%file%.%column%")
```

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