

# Package ‘wkb’

March 24, 2016

**Type** Package

**Title** Convert Between Spatial Objects and Well-Known Binary Geometry

**Version** 0.3-0

**Imports** sp

**Suggests** testthat

**Date** 2016-03-24

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**Description** Utility functions to convert between the 'Spatial' classes specified by the package 'sp', and the well-known binary '(WKB)' representation for geometry specified by the Open Geospatial Consortium. Supports 'Spatial' objects of class 'SpatialPoints', 'SpatialPointsDataFrame', 'SpatialLines', 'SpatialLinesDataFrame', 'SpatialPolygons', and 'SpatialPolygonsDataFrame'. Supports 'WKB' geometry types 'Point', 'LineString', 'Polygon', 'MultiPoint', 'MultiLineString', and 'MultiPolygon'. Includes extensions to enable creation of maps with 'TIBCO Spotfire'.

**BugReports** <https://github.com/ianmcook/wkb/issues>

**NeedsCompilation** no

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**RoxygenNote** 5.0.1

**Repository** CRAN

**Date/Publication** 2016-03-24 23:49:03

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`hex2raw`*Convert String Hex Representation to Raw Vector*

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**Description**

Converts a string hexadecimal representation to a raw vector.

**Usage**

```
hex2raw(hex)
```

**Arguments**

`hex` character string or character vector containing a hexadecimal representation.

**Details**

Non-hexadecimal characters are removed.

**Value**

A [raw](#) vector.

The return value is a list of raw vectors when the argument `hex` contains more than one hexadecimal representation.

**See Also**

`raw2hex` in package [PKI](#), [readWKB](#)

**Examples**

```
# create a character string containing a hexadecimal representation
hex <- "0101000000000000000000f03f00000000000840"

# convert to raw vector
wkb <- hex2raw(hex)

# create a character vector containing a hexadecimal representation
hex <- c("01", "01", "00", "00", "00", "00", "00", "00", "00", "00", "00",
        "f0", "3f", "00", "00", "00", "00", "00", "00", "00", "08", "40")

# convert to raw vector
wkb <- hex2raw(hex)

# create vector of two character strings each containing a hex representation
hex <- c("0101000000000000000000f03f00000000000840",
        "01010000000000000000004000000000000040")
```

```
# convert to list of two raw vectors
wkb <- hex2raw(hex)
```

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readWKB *Convert WKB to Spatial Objects*

---

## Description

Converts well-known binary (WKB) geometry representations to Spatial objects.

## Usage

```
readWKB(wkb, id = NULL, proj4string = CRS(as.character(NA)))
```

## Arguments

wkb	list in which each element is a <a href="#">raw</a> vector consisting of a WKB geometry representation.
id	character vector of unique identifiers of geometries. The length of id must be the same as the length of the wkb list.
proj4string	projection string of class <a href="#">CRS</a> .

## Details

Supported WKB geometry types are Point, LineString, Polygon, MultiPoint, MultiLineString, and MultiPolygon. All elements in the list must have the same WKB geometry type. The WKB geometry representations may use little-endian or big-endian byte order.

The argument wkb may also be a [raw](#) vector consisting of one WKB geometry representation. In that case, the argument id must have length one.

## Value

An object inheriting class [Spatial](#).

The return value may be an object of class [SpatialPoints](#), [SpatialLines](#), [SpatialPolygons](#), or a list in which each element is an object of class [SpatialPoints](#). The class of the return value depends on the WKB geometry type as shown in the table below.

Type of WKB geometry	Class of return value
Point	<a href="#">SpatialPoints</a>
LineString	<a href="#">SpatialLines</a>
Polygon	<a href="#">SpatialPolygons</a>
MultiPoint	list of <a href="#">SpatialPoints</a>
MultiLineString	<a href="#">SpatialLines</a>
MultiPolygon	<a href="#">SpatialPolygons</a>

**See Also**

[writeWKB](#), [hex2raw](#)

**Examples**

```
# create a list of WKB geometry representations of type Point
wkb <- list(
  as.raw(c(0x01, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
           0xf0, 0x3f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x08, 0x40)),
  as.raw(c(0x01, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
           0x00, 0x40, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x40))
)

# convert to object of class SpatialPoints
obj <- readWKB(wkb)

# create a list of WKB geometry representations of type MultiPoint
wkb <- list(
  as.raw(c(0x01, 0x04, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x01, 0x01,
           0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xf0, 0x3f,
           0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x08, 0x40)),
  as.raw(c(0x01, 0x04, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x01, 0x01,
           0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x40,
           0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x40)))

# convert to list of objects of class SpatialPoints
obj <- readWKB(wkb)

# create a list of WKB geometry representations of type MultiLineString
wkb <- list(
  as.raw(c(0x01, 0x05, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x01, 0x02,
           0x00, 0x00, 0x00, 0x02, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
           0x00, 0xf0, 0x3f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x08,
           0x40, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x40, 0x00, 0x00, 0x00,
           0x00, 0x00, 0x00, 0x40)),
  as.raw(c(0x01, 0x05, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x01, 0x02,
           0x00, 0x00, 0x00, 0x02, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
           0x00, 0xf0, 0x3f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xf0,
           0x3f, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x40, 0x00, 0x00,
           0x00, 0x00, 0xf8, 0x3f)))

# convert to object of class SpatialLines
obj <- readWKB(wkb)

# create a list of WKB geometry representations of type Polygon
wkb <- list(
  as.raw(c(0x01, 0x03, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x05, 0x00,
           0x00, 0x00, 0x34, 0x03, 0xf0, 0xac, 0xce, 0x66, 0x5d, 0xc0, 0x8f,
           0x27, 0x95, 0x21, 0xab, 0xa6, 0x44, 0x40, 0xa0, 0x32, 0x81, 0x18,
```

```

0x78, 0x83, 0x5d, 0xc0, 0xc8, 0xd2, 0xa0, 0xee, 0x23, 0x0b, 0x41,
0x40, 0x80, 0xec, 0x72, 0x54, 0xde, 0xb1, 0x5f, 0xc0, 0xc8, 0xd2,
0xa0, 0xee, 0x23, 0x0b, 0x41, 0x40, 0xec, 0x1b, 0x04, 0xc0, 0x87,
0xce, 0x5f, 0xc0, 0x8f, 0x27, 0x95, 0x21, 0xab, 0xa6, 0x44, 0x40,
0x34, 0x03, 0xf0, 0xac, 0xce, 0x66, 0x5d, 0xc0, 0x8f, 0x27, 0x95,
0x21, 0xab, 0xa6, 0x44, 0x40)),
as.raw(c(0x01, 0x03, 0x00, 0x00, 0x00, 0x01, 0x00, 0x00, 0x00, 0x05, 0x00,
0x00, 0x00, 0x08, 0x36, 0xdc, 0x8b, 0x9f, 0x3d, 0x51, 0xc0, 0x0f,
0xb3, 0x2a, 0x6a, 0x3f, 0x1c, 0x46, 0x40, 0x47, 0xcb, 0x54, 0xe7,
0xcb, 0x5e, 0x51, 0xc0, 0x45, 0x81, 0x50, 0x31, 0xfa, 0x80, 0x42,
0x40, 0xa9, 0xba, 0x74, 0x6d, 0xf5, 0xa1, 0x53, 0xc0, 0x45, 0x81,
0x50, 0x31, 0xfa, 0x80, 0x42, 0x40, 0xe8, 0x4f, 0xed, 0xc8, 0x21,
0xc3, 0x53, 0xc0, 0x0f, 0xb3, 0x2a, 0x6a, 0x3f, 0x1c, 0x46, 0x40,
0x08, 0x36, 0xdc, 0x8b, 0x9f, 0x3d, 0x51, 0xc0, 0x0f, 0xb3, 0x2a,
0x6a, 0x3f, 0x1c, 0x46, 0x40)))

# convert to object of class SpatialPolygons
obj <- readWKB(wkb)

# specify id and proj4string
obj <- readWKB(
  wkb,
  id = c("San Francisco", "New York"),
  proj4string = sp::CRS("+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs")
)

```

---

writeEnvelope

*Envelope of Spatial Objects*


---

## Description

Takes a `Spatial` object and returns a data frame with six columns representing the envelope of each element in the `Spatial` object.

## Usage

```
writeEnvelope(obj, centerfun = mean)
```

## Arguments

<code>obj</code>	object inheriting class <code>Spatial</code> .
<code>centerfun</code>	function to apply to the x-axis limits and y-axis limits of the bounding box to obtain the x-coordinate and y-coordinate of the center of the bounding box.

## Details

`obj` may be an object of class `SpatialPoints`, `SpatialPointsDataFrame`, `SpatialLines`, `SpatialLinesDataFrame`, `SpatialPolygons`, or `SpatialPolygonsDataFrame`, or a list in which each element is an object of class `SpatialPoints` or `SpatialPointsDataFrame`.

**Value**

A data frame with six columns named XMax, XMin, YMax, YMin, XCenter, and YCenter. The first four columns represent the corners of the bounding box of each element in obj. The last two columns represent the center of the bounding box of each element in obj. The number of rows in the returned data frame is the same as the length of the argument obj.

When this function is run in TIBCO Enterprise Runtime for R (TERR), the columns of the returned data frame have the SpotfireColumnMetaData attribute set to enable TIBCO Spotfire to recognize them as containing envelope information.

**See Also**

Example usage at [writeWKB](#)

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writeWKB	<i>Convert Spatial Objects to WKB</i>
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**Description**

Converts Spatial objects to well-known binary (WKB) geometry representations.

**Usage**

```
writeWKB(obj, endian = "little")
```

**Arguments**

obj	object inheriting class <a href="#">Spatial</a> .
endian	The byte order ("big" or "little") for encoding numeric types. The default is "little".

**Details**

The argument obj may be an object of class [SpatialPoints](#), [SpatialPointsDataFrame](#), [SpatialLines](#), [SpatialLinesDataFrame](#), [SpatialPolygons](#), or [SpatialPolygonsDataFrame](#), or a list in which each element is an object of class [SpatialPoints](#) or [SpatialPointsDataFrame](#).

**Value**

A list with class AsIs. The length of the returned list is the same as the length of the argument obj. Each element of the returned list is a [raw](#) vector consisting of a WKB geometry representation. The WKB geometry type depends on the class of obj as shown in the table below.

Class of obj	Type of WKB geometry
SpatialPoints or SpatialPointsDataFrame	Point
list of SpatialPoints or SpatialPointsDataFrame	MultiPoint
SpatialLines or SpatialLinesDataFrame	MultiLineString
SpatialPolygons or SpatialPolygonsFrame	Polygon

The byte order of numeric types in the returned WKB geometry representations depends on the value of the argument `endian`. Little-endian byte order is known as NDR encoding, and big-endian byte order is known as XDR encoding.

When this function is run in TIBCO Enterprise Runtime for R (TERR), the return value has the `SpotfireColumnMetaData` attribute set to enable TIBCO Spotfire to recognize it as a WKB geometry representation.

### See Also

[writeEnvelope](#), [readWKB](#)

### Examples

```
# load package sp
library(sp)

# create an object of class SpatialPoints
x = c(1, 2)
y = c(3, 2)
obj <- SpatialPoints(data.frame(x, y))

# convert to WKB Point
wkb <- writeWKB(obj)

# create a list of objects of class SpatialPoints
x1 = c(1, 2, 3, 4, 5)
y1 = c(3, 2, 5, 1, 4)
x2 <- c(9, 10, 11, 12, 13)
y2 <- c(-1, -2, -3, -4, -5)
Sp1 <- SpatialPoints(data.frame(x1, y1))
Sp2 <- SpatialPoints(data.frame(x2, y2))
obj <- list("a"=Sp1, "b"=Sp2)

# convert to WKB MultiPoint
wkb <- writeWKB(obj)

# create an object of class SpatialLines
l1 <- data.frame(x = c(1, 2, 3), y = c(3, 2, 2))
l1a <- data.frame(x = l1[, 1] + .05, y = l1[, 2] + .05)
l2 <- data.frame(x = c(1, 2, 3), y = c(1, 1.5, 1))
S11 <- Line(l1)
S11a <- Line(l1a)
S12 <- Line(l2)
S1 <- Lines(list(S11, S11a), ID = "a")
S2 <- Lines(list(S12), ID = "b")
obj <- SpatialLines(list(S1, S2))

# convert to WKB MultiLineString
wkb <- writeWKB(obj)
```

```
# create an object of class SpatialPolygons
triangle <- Polygons(
  list(
    Polygon(data.frame(x = c(2, 2.5, 3, 2), y = c(2, 3, 2, 2)))
  ), "triangle")
rectangles <- Polygons(
  list(
    Polygon(data.frame(x = c(0, 0, 1, 1, 0), y = c(0, 1, 1, 0, 0))),
    Polygon(data.frame(x = c(0, 0, 2, 2, 0), y = c(-2, -1, -1, -2, -2)))
  ), "rectangles")
obj <- SpatialPolygons(list(triangle, rectangles))

# convert to WKB Polygon
wkb <- writeWKB(obj)

# use the WKB as a column in a data frame
ds <- data.frame(ID = c("a", "b"), Geometry = wkb)

# calculate envelope columns and cbind to the data frame
coords <- writeEnvelope(obj)
ds <- cbind(ds, coords)
```



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