

TIME ZONE (Firebird 4.0)

Initial support in IBExpert since version 2018.12.15.

Source: [Time Zone support \(FB 4.0\)](#)

Time Zone support (FB 4.0)

Time zone support consists of `TIME WITH TIME ZONE` and `TIMESTAMP WITH TIME ZONE` data types, expressions and statements to work with time zones and conversion between data types without/with time zones.

The first important thing to understand is that `TIME WITHOUT TIME ZONE`, `TIMESTAMP WITHOUT TIME ZONE` and `DATE` data types are defined to use the session time zone when converting from or to a `TIME WITH TIME ZONE` or `TIMESTAMP WITH TIME ZONE`. `TIME` and `TIMESTAMP` are synonymous to theirs respectively `WITHOUT TIME ZONE` data types.

The session time zone, as the name implies, can be a different one for each database attachment. It can be set with the `isc_dpb_session_time_zone` DPB, and if not, it starts by default defined to be the `firebird.conf` parameter `DefaultTimeZone` or the same time zone used by the Firebird OS process when the parameter is not defined. A change in `DefaultTimeZone` configuration or the OS time zone does not changes the default of a running Firebird process.

It can then be changed with `SET TIME ZONE` statement to a given time zone or reset to its original value with `SET TIME ZONE LOCAL`.

A time zone may be a string with a time zone region (for example, `America/Sao_Paulo`) or a hours:minutes displacement (for example, `-03:00`) from GMT.

A time/timestamp with time zone is considered equal to another time/timestamp with time zone if their conversion to UTC are equal, for example, time `'10:00 -02'` = time `'09:00 -03'`, since both are the same as time `'12:00 GMT'`. This is also valid in the context of `UNIQUE` constraints and for sorting purposes.

Data types

`TIME [ { WITH | WITHOUT } TIME ZONE ]`

`TIMESTAMP [ { WITH | WITHOUT } TIME ZONE ]`

Storage

TIME/TIMESTAMP WITH TIME ZONE has respectively the same storage of TIME/TIMESTAMP WITHOUT TIME ZONE plus 2 bytes for the time zone identifier or displacement.

The time/timestamp parts are stored in UTC (translated from the informed time zone).

Time zone identifiers (from regions) are put directly in the `time_zone` field. They start from 65535 (which is the GMT code) and are decreasing as new time zones were/are added.

Time zone displacements (+/- HH:MM) are encoded with $(\text{sign} * (\text{HH} * 60 + \text{MM})) + 1439$. For example, a 00:00 displacement is encoded as $(1 * (0 * 60 + 0)) + 1439 = 1439$ and -02:00 as $(-1 * (2 * 60 + 0)) + 1439 = 1319$.

API structs

```
struct ISC_TIME_TZ
{
    ISC_TIME utc_time;
    ISC_USHORT time_zone;
};

struct ISC_TIMESTAMP_TZ
{
    ISC_TIMESTAMP utc_timestamp;
    ISC_USHORT time_zone;
};
```

API functions (FirebirdInterface.idl - IUtil interface)

```
void decodeTimeTz(
    Status status,
    const ISC_TIME_TZ* timeTz,
    uint* hours,
    uint* minutes,
    uint* seconds,
    uint* fractions,
    uint timeZoneBufferLength,
    string timeZoneBuffer
);
```

```
void decodeTimeStampTz(
    Status status,
    const ISC_TIMESTAMP_TZ* timeStampTz,
    uint* year,
    uint* month,
    uint* day,
    uint* hours,
    uint* minutes,
    uint* seconds,
    uint* fractions,
    uint timeZoneBufferLength,
    string timeZoneBuffer
);

void encodeTimeTz(
    Status status,
    ISC_TIME_TZ* timeTz,
    uint hours,
    uint minutes,
    uint seconds,
    uint fractions,
    const string timeZone
);

void encodeTimeStampTz(
    Status status,
    ISC_TIMESTAMP_TZ* timeStampTz,
    uint year,
    uint month,
    uint day,
    uint hours,
    uint minutes,
    uint seconds,
    uint fractions,
    const string timeZone
);
```

Time zone string syntax

```
<time zone string> ::=
    '<time zone>'

<time zone> ::=
    <time zone region> |
    [+/-] <hour displacement> [: <minute displacement>]
```

Examples

```
'America/Sao_Paulo'  
'-02:00'  
'+04'  
'04:00'  
'04:30'
```

TIME WITH TIME ZONE and TIMESTAMP WITH TIME ZONE literals

```
<time with time zone literal> ::=  
    time '<time> <time zone>'  
  
<timestamp with time zone literal> ::=  
    timestamp '<timestamp> <time zone>'
```

Examples

```
time '10:00 America/Los_Angeles'  
time '10:00:00.5 +08'  
timestamp '2018-01-01 10:00 America/Los_Angeles'  
timestamp '2018-01-01 10:00:00.5 +08'
```

Statements and expressions

SET TIME ZONE statement

Changes the session time zone.

Syntax

```
SET TIME ZONE { <time zone string> | LOCAL }
```

Examples

```
set time zone '-02:00';  
  
set time zone 'America/Sao_Paulo';  
  
set time zone local;
```

SET TIME ZONE BIND statement

Changes the session time zone bind for compatibility with old clients.

The default is `NATIVE`, which means that `TIME WITH TIME ZONE` and `TIMESTAMP WITH TIME ZONE` expressions are returned with their new data types to the client.

Old clients may not understand the new data types, so it's possible to define the bind to `LEGACY` and the expressions will be returned as `TIME WITHOUT TIME ZONE` and `TIMESTAMP WITHOUT TIME ZONE`, with appropriate conversion.

The bind configuration is also applicable to input parameters.

Syntax

```
SET TIME ZONE BIND { NATIVE | LEGACY }
```

Examples

```
set time zone bind native;  
set time zone bind legacy;
```

AT expression

Translates a time/timestamp value to its correspondent value in another time zone.

If `LOCAL` is used, the value is converted to the session time zone.

Syntax

```
<at expr> ::=  
    <expr> AT { TIME ZONE <time zone string> | LOCAL }
```

Examples

```
select time '12:00 GMT' at time zone '-03'  
from rdb$database;  
  
select current_timestamp at time zone 'America/Sao_Paulo'  
from rdb$database;  
  
select timestamp '2018-01-01 12:00 GMT' at local  
from rdb$database;
```

EXTRACT expressions

Two new `EXTRACT` expressions have been added:

- **TIMEZONE_HOUR**: extracts the time zone hours displacement
- **TIMEZONE_MINUTE**: extracts the time zone minutes displacement

Examples

```
select extract(timezone_hour from current_time)
from rdb$database;

select extract(timezone_minute from current_timestamp)
from rdb$database;
```

LOCALTIME expression

Returns the current time as a **TIME WITHOUT TIME ZONE**, i.e., in the session time zone.

Example

```
select localtime
from rdb$database;
```

LOCALTIMESTAMP expression

Returns the current timestamp as a **TIMESTAMP WITHOUT TIME ZONE**, i.e., in the session time zone.

Example

```
select localtimestamp
from rdb$database;
```

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