> SYSTEM UPDATE // CLARION

Master the DATETIME Data Type

[100-Nanosecond Precision. Native SQL Integration. Zero Legacy Workarounds.]



Gemini Notebook

The Legacy Composite

```
Orderdate          STRING(8)
Orderdate_GROUP    GROUP, OVER(Orderdate)
Orderdate_DATE     DATE
Orderdate_TIME     TIME
                   END
```

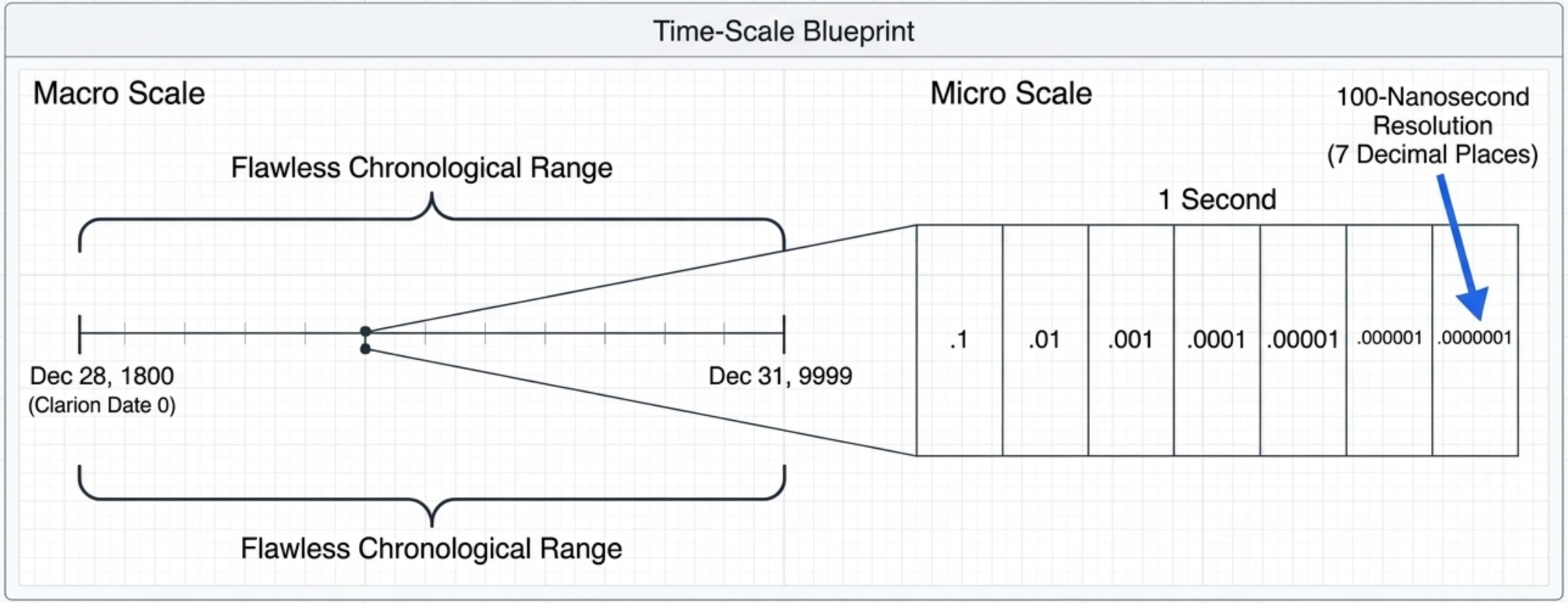
The Paradigm Shift

```
Modified  DATETIME,NAME('modified')
```

Key Takeaway: Eliminate 8-byte composite string hacks. DATETIME is a unified, native scalar type designed to directly map to modern SQL timestamp columns without manual overlays.

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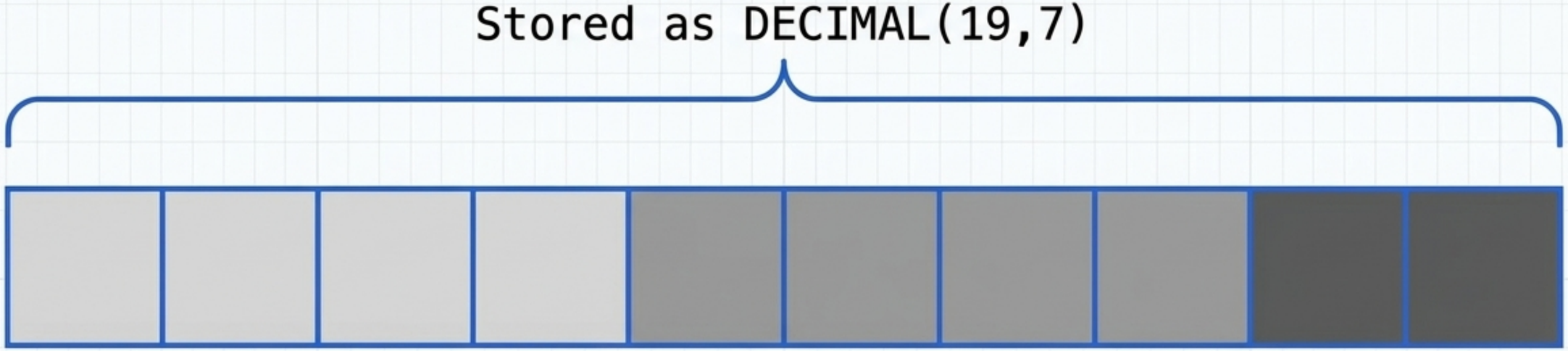
Time-Scale Blueprint



Uncompromising Range & Precision: Represents the **exact number of seconds** elapsed since **midenight, December 28, 1800**, carried to seven decimal places.

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Anatomical “x-ray” Pootprint



Compiler Tag

Automatically tags the external variable name with `|DATETIME` for exact driver mapping.

Zero State

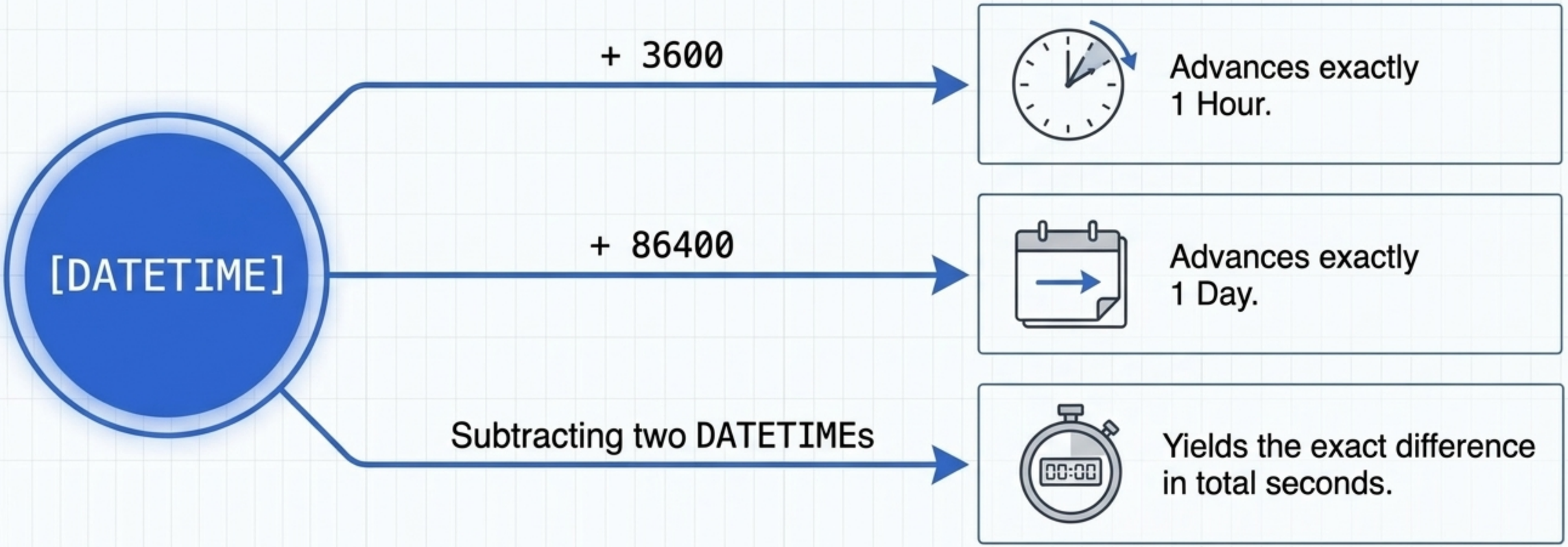
A numeric value of 0 explicitly represents a blank/empty date-time.

Natural Sorting

Values compare and sort perfectly in chronological time order at the database level.

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Arithmetic Operations Blueprint



Rule: Second-Based Math. All addition and subtraction operates purely in whole seconds, eliminating the need to calculate separate date and time offsets.

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The Gotcha: Integer Overflow Trap

The Trap (Integer Math):

```
dt = date * 86400 + time_offset
```

Because `date` and `86400` are integers, multiplication wraps negative after January 1869 (exceeding the LONG limit).

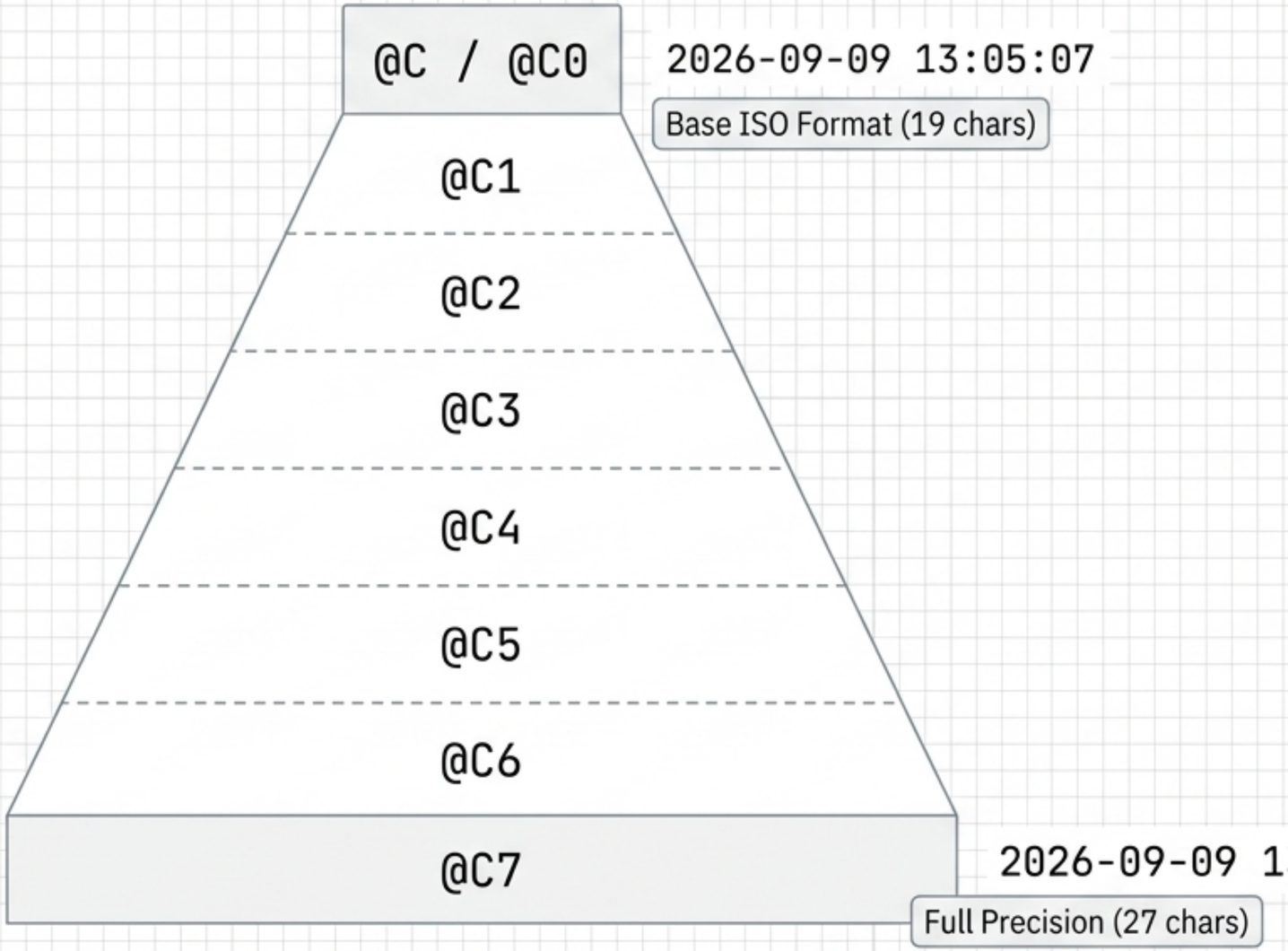
The **Fix** (Decimal Math):

```
dt = date * 86400.0 +
CHOOSE(time = 0, 0,
       (time - 1) / 100)
```

Force decimal math by using `86400.0` (or copying the date to a `DECIMAL` first). This keeps the expression safely on the decimal stack.

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Granularity Funnel: Picture Formatting Tokens



Standardization & Input

- Uses standard ISO formatting: hyphen, space, and colons.
- ENTRY controls and DEFORMAT automatically accept full strings, the ‘T’ separator format, or partial dates.

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The DateTimeUtil Class

Include DATETIME.INC for safe, math-free conversions.

1. Instantiation

`Set(dt, date, time)`

Safely assigns legacy date/time values into the new carrier, handling math automatically.

2. Precision Clock

`SetNow(dt)`

Captures the exact system time natively to 100-nanosecond precision.

3. Extraction

`GetDate(), GetTime(), SecOfDay()`

Pulls out required individual components from the carrier.

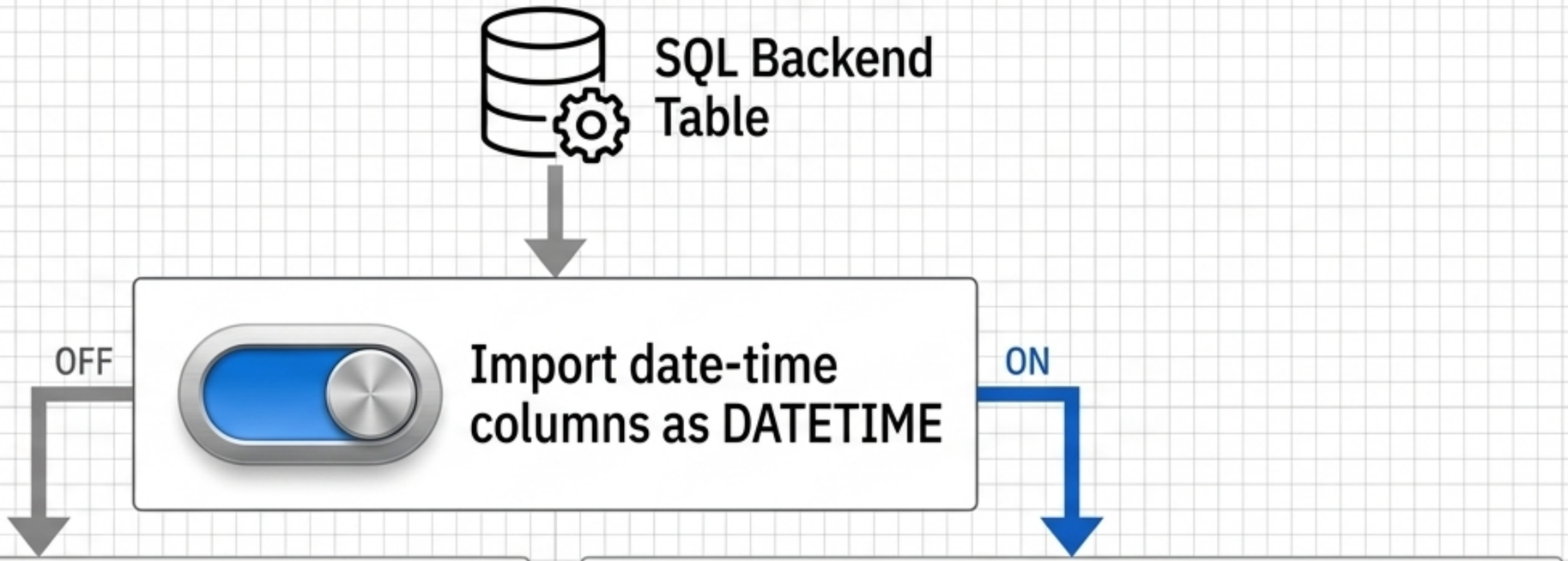
4. Display

`Pict(dt, picture)`

Formats parts through standard tokens (e.g., `Pict(dt,'@D4')` or `Pict(dt,'@T4')`).

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Data Dictionary Import Workflow



Legacy Behavior

Year (INT) — Month (INT) — Day (INT) — Time (LONG)

Retains the legacy composite structure. Existing dictionaries and re-imports experience zero breaking changes.

Modern Pipeline

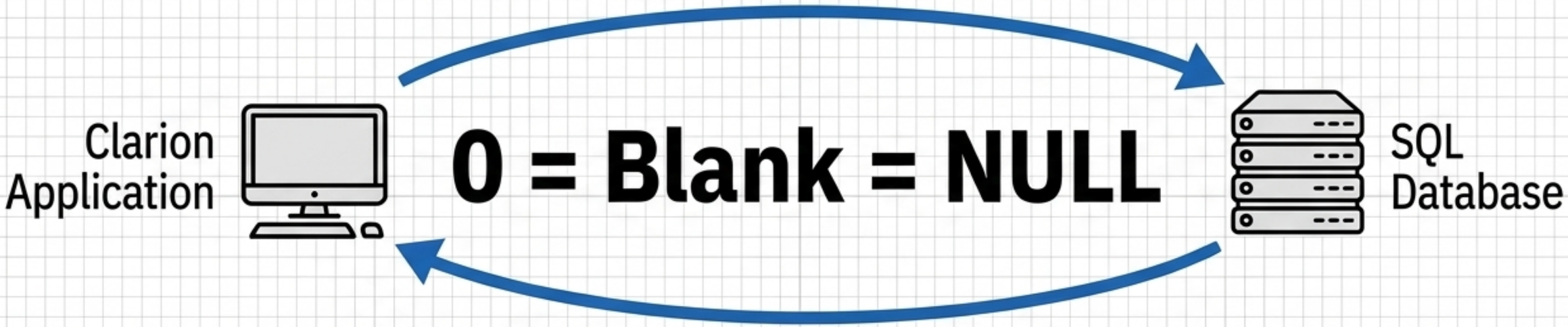
CreatedOn (DATETIME)

Creates one native field per timestamp column, auto-defaulting to the **@C7** picture. Eliminates manual overlays.

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Application/Database Data Translation Cycle

Writing a zero (or **CLEAR**) to a **DATETIME** field writes a clean **NULL** to the backend.



Reading a backend NULL safely returns a 0 to the Clarion application.

Filtering Note: When used in a `VIEW` (via `PROP:Filter`), comparisons are translated into native backend *timestamp literals* evaluated entirely on the server.

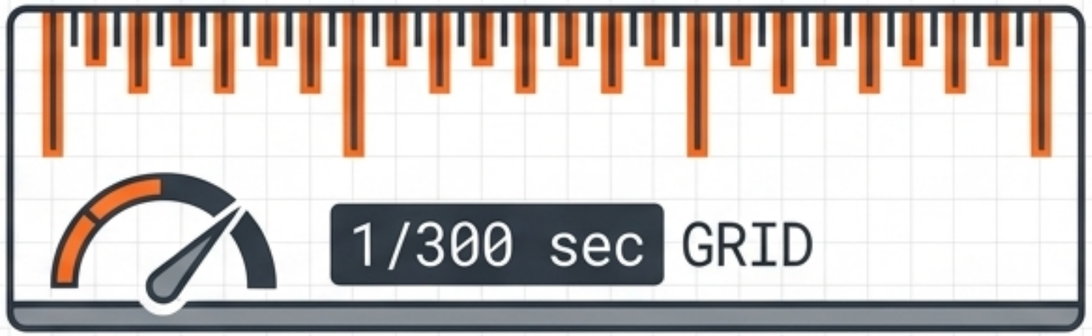
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Compatibility & Mapping Matrix

Backend Driver	Target Column Type	Behavior / Storage Under-the-Hood
Microsoft SQL Server	`datetime2(7)`	Also reads/writes `datetime2(0-6)`, `datetime`, `smalldatetime` (fraction truncation handled perfectly).
PostgreSQL & ODBC	`timestamp(6)`	Precision natively supported to microseconds.
Oracle	`TIMESTAMP(7)`	Handled under the hood via PDECIMAL. Note that Oracle natively rounds fractional parts.
SQLite	`DATETIME`	Stored natively as ISO text on disk.
Non-SQL Drivers	—	Retains the exact 10-byte binary decimal value as-is in the record structure.

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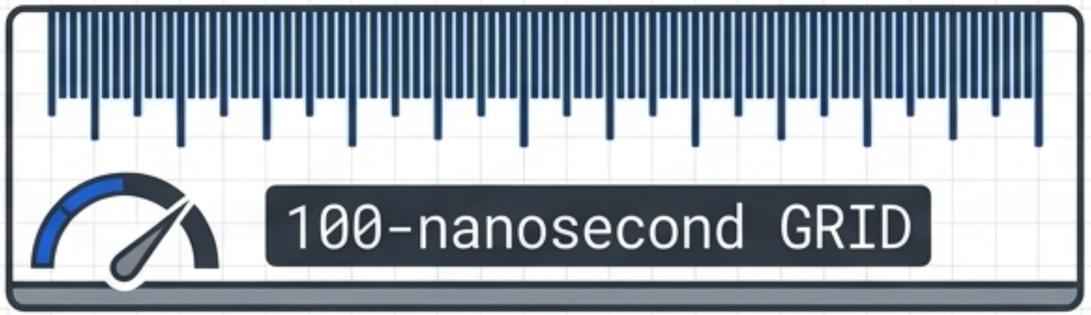
Legacy SQL Server ‘datetime’



Operates on a bizarre 1/300-second grid.

⚠ **WATCH** and **PUT** operations on these columns will only match grid-exact fractions, causing potential concurrency mismatches.

Modern SQL Server ‘datetime2’



Operates on a true 100-nanosecond grid.

✓ Always use **datetime2** for new columns to utilize the full precision of the Clarion **DATETIME** type without locking failures.

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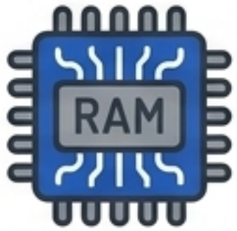
Input

UI Control accepts @C7 ISO string.



Processing

DateTimeUtil updates data in memory.



Memory

Stored optimally as DECIMAL(19,7).



Schema

Dictionary Sync translates definitions.



Persistence

Driver persists literal mapped to datetime2(7).

DATETIME isn't just a variable type; it is an end-to-end engineered pipeline eliminating years of structural hacks and bridging Clarion applications seamlessly with modern SQL standards.

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