

# fn match\_datetime\_component

Michael Shoemate

This proof resides in “**contrib**” because it has not completed the vetting process.

Proves soundness of `match_datetime_component` in `mod.rs` at commit `f5bb719` (outdated<sup>1</sup>).

`match_datetime_component` returns the data type and number of possible unique values of a compute operation that retrieves a datetime component.

## 1 Hoare Triple

### Precondition

#### Compiler-verified

- Argument `temporal_function` of type `TemporalFunction`

#### Caller-verified

None

### Pseudocode

```
1 def match_datetime_component(
2     temporal_function: TemporalFunction,
3 ) -> DataType | None:
4     return ({
5         Millennium: DataType.UInt32,
6         Century: DataType.Int32,
7         Year: DataType.Int32,
8         IsoYear: DataType.Int32,
9         Quarter: DataType.Int8,
10        Month: DataType.Int8,
11        Week: DataType.Int8,
12        WeekDay: DataType.Int8,
13        Day: DataType.Int8,
14        OrdinalDay: DataType.Int16,
15        Hour: DataType.Int8,
16        Minute: DataType.Int8,
17        Second: DataType.Int8,
18        Millisecond: DataType.Int32,
19        Microsecond: DataType.Int32,
20        Nanosecond: DataType.Int32,
21    }).get(temporal_function)
```

<sup>1</sup>See new changes with `git diff f5bb719..f99639a rust/src/transformations/make_stable_expr/namespace_dt/expr_datetime_component.rs`

## Postcondition

**Theorem 1.1.** For any choice of `temporal_function`, returns the data type of the output if the input is an infallible row-by-row temporal expression, otherwise returns none.

*Proof.* For each choice of `temporal_function`, the data type is directly verified via testing. Infallible row-by-row is verified by inspection of the Polars source code.  $\square$