

0.1 Rate Of

The Operation *rateOf* calculates the number of times something occurs within an interval of time given a unit of time.

$$rateOf(nOccurrences, start, end, unit)$$

Where the output translates to: the rate of occurrence per unit within interval

- *nOccurrences* is the number of times something happened and should be an Integer (called *nO?* bellow)
- *start* is an ISO 8601 timestamp which serves as the first timestamp within the interval
- *end* is an ISO 8601 timestamp which servers as the last timestamp within the interval
- *unit* is a String Enum representing the unit of time

This can be seen in the definition of *rateOf* bellow.

$$\begin{array}{l}
 \text{RateOf}[\mathbb{N}, \text{TIMESTAMP}, \text{TIMESTAMP}, \text{TIMEUNIT}] \text{ ———} \\
 nO? : \mathbb{N} \\
 rate! : \mathbb{Z} \\
 start?, end? : \text{TIMESTAMP} \\
 unit? : \text{TIMEUNIT} \\
 rateOf_ : \mathbb{N} \times \text{TIMESTAMP} \times \text{TIMESTAMP} \times \text{TIMEUNIT} \rightarrow \mathbb{Z} \\
 \hline
 rate! = rateOf(nO?, start?, end?, unit?) \bullet \\
 \quad \text{let } interval == isoToUnix(end) - isoToUnix(start) \\
 \quad \quad unitS == toSeconds(unit?) \\
 \quad = nO? \div (interval \div units)
 \end{array}$$

The only other functionality required by *rateOf* is supplied via basic arithmetic

$$\begin{aligned}
 start &= 2015 - 11 - 18T12 : 17 : 00Z \\
 end &= 2015 - 11 - 18T14 : 17 : 00Z \\
 unit &= second \\
 nO? &= 10 \\
 startN &= isoToUnix(start) = 1447849020 \\
 endN &= isoToUnix(end) = 1447856220 \\
 interval &= endN - startN = 7200 \\
 unitN &= toSeconds(unit) = 60 \\
 0.001389 &= rateOf(nO?, start, end, unit) \Rightarrow 10 \div (7200 \div 60) \\
 5 &= rateOf(nO?, start, end, hour) \Rightarrow 10 \div (7200 \div 3600)
 \end{aligned}$$