What is counted is the fundamental ***quantum*** of time. By self-referring definition, this can only be the clock frequency f_c of the physical ***entity*** chosen by us, as the clock for us.
We defined a clock number $t_c = n_c/f_c$, this is the information ***quantity*** of the development made by the frequency f_c by the counts n_c. This number t_c is called a *development parameter*, which is given by information development in the local clock.
The designation *-meter* for the word *para-meter* stands for the fundamental measure of any ***entity*** and the designation *para-* refers to anything else but the self-referring clock, which defines a measure *carried* by the frequency f_c and counted by the clock itself as an *internal* ***quantity***.
This is promoted to an information *development parameter* t_c for all ***entities*** in the local physics of the clock. (a paraphysical sense) – For the second clock the clock frequency is $f_c = 1\ [Hz]$.

1.3.4.2. The Frequency in Action

The ***quantum*** in the concept of time is done by one causal action. The action of the causal process A,B,C ... or 1,2,3, ... is dependent on the capability to distinguish A from B from C or to count 1,2,3, ... $\in \vec{\mathbb{N}}$.
I.e., the action of the causal process is that we distinguish the first event A from the second event B, and then the third event C, etc. We say we ***quantize*** events and count them.
If all the events are quite similar but distinguishable and thus countable, we say they are periodic with a specific frequency f. If the events are quite equal, each event delivers at least one information particle with an ***identical quantity*** E_f, which just shows that the events are alike.
As a specific frequency f requires identical information particles for each period, we can guess that the amount for a particle of information E_f is proportional to the frequency f.
We can write $E_f = h{\cdot}f$, where we consider h as a factor for the action act.

1.3.4.3. Associations with the Known Physics

From 20th-century physics (Einstein 1905), we know that the photon energy is quantised with the energy $E_f = h{\cdot}f$, here h is the famous Planck's constant. We assume the idea that an information particle from the clock event is synonymous with a photon.
Since $f = \frac{n}{t}$, we can write $E_f = h{\cdot}f = h\frac{n}{t}$. We get for clock numbers $t = \frac{n}{f} = h\frac{n}{E_f}$.

This corresponds to, what we know directly from daily life:

- Do we have high energy, things happen quickly!
- Do we have low energy, we must wait longer!

Frequency in modern quantum physics is synonymous with what we call energy or rather quantum-energy.
Planck's constant h is considered as a constant ratio between frequency and quantum energy.
By simplification we can set h=1, which results in two possibilities:

- Quantum-energy E_f can be measured in [Hz], which is the number of cycles per second, or
- Frequency f may be measured in [eV] or [Joule] which are common energy units.

According to the statistical mechanics quantum-energy and thus also frequency can be compared to the temperature; $E_f = h{\cdot}f \approx k{\cdot}T$, where k is the Boltzmann constant, and T is the temperature in degrees °Kelvin. (We will not go further into the concept of temperature here but only mention some equivalency to the concept of frequency).

The stability of the Caesium clock frequency is based on a quantum state[17], with the photon energy $E_f = 9{,}192{,}631{,}770\ [Hz]$. This corresponds to a temperature of ½°K. Therefore, the microwave radio signal from the Caesium-clock is a classical electromagnetic wave, considered as a collective condensate of photons (Bose particles). When we count the oscillations

[17] Quantum states between the two hyperfine levels of the ground state of the caesium atom Cs_{133}.

electronically, each cycle delivers several hundred identical photons to the counter to overcome the thermal noise of the measuring device. By the radio wave concept, it is easy to understand that clock oscillation can be counted individually by electronics.
For visible light photons, the quantum energies are so high that they overcome thermal noise (at room temperature) and can be counted individually. However, it is difficult to count the collective oscillations of the single photon wave, but I think it is much easier to understand that the frequency stability is based on the quantum-energy $E_f = h{\cdot}f$ of individual photons.
The latest attempt at "quantum clocks" is based on visible light. (exceedingly difficult to count)
Visible light oscillates almost a million billion times per second (about ½·10^{15}[Hz]).
One can imagine clocks that go extremely fast, e.g., a γ-particle (16 TeV) with frequency 3.9·10^{27}[Hz] is observed. – The most detailed limit for a Time quantum one can imagines is the so-called Planck time of 5.4·10^{-44}[s] , – a clock for that is unbelievable.

1.3.5. Continuous Time and Action

The timeline helps to illustrate the sequential order of 'the time points' (numbers), and our concept of time is founded on the ***primary quality*** given by the ***causal action*** *FORWARD*.
Time for us is only a *secondary quality*, something we imagine, but never learn.
Counting sequential with the natural numbers $\vec{\mathbb{N}}$ form an order relation in the integers $\mathbb{Z}$.
The next number is greater than the previous one in the action of counting.
We say that $\mathbb{Z}$ it is active sequentially numerable expressed as $\vec{\mathbb{Z}}$.
As with the standard for a second, we see that the time unit (second) is dividable, but the measure $t = \frac{n}{f_{Cs}} \in \mathbb{Q}$ is a rational number by definition, which implies that timing always is rational, and thereby numerable. In contrast, the continuum of real numbers $\mathbb{R}$ is non-numerable.
The individual real numbers in order cannot be counted.
To perform mathematical analysis in physics with a parameter for development, we say that a continuum of real numbers $t \in \mathbb{R}$ represent a continuous development process for information.

... −3 −2 −1 0 1 2 3 4 5 6 7 8 9 ... →

We go as far as; the development parameter $t \in \mathbb{R}$ represent a point in the development. – A point in time. – That point can never exist in natural space of physics!
But only in the parameter space $\mathbb{R}$, that only exists in our minds.

1.3.5.1. Continuous Timing

The real numbers are – besides the algebraic rules - defined by a transitive order relation scheme, hence having two different numbers the one is larger than the other,

(1.9) $\quad t_1 \neq t_2 \Leftrightarrow t_1 > t_2 \vee t_1 < t_2$, and further $t_2 < t_3 < t_4 \Rightarrow t_2 < t_4$.

The real numbers continuum will not be treated further here. – The progressive continuous process is strongly connected to the order structure we have given the real numbers.
I define the term $\vec{\mathbb{R}}$ as the overall monotone growing real numbers and claim that
– For us – the local development timing parameter $t \in \vec{\mathbb{R}}$ can only grow *FORWARD*.
I also introduce a concept for information synchronous ordering of the real numbers that synchronises the development timing parameter with a clock with a count frequency f_c

(1.10) $\quad \vec{\mathbb{R}}_{s+} \coloneqq \{ t \in \vec{\mathbb{R}} \mid \lfloor (t-s){\cdot}f_c \rfloor \in \vec{\mathbb{N}} \ \wedge\ f_c{>}0 \ \wedge\ f_c, t, s \in \mathbb{R} \}$,

where $s \in \mathbb{R}$ is an arbitrary start number.[18] The map

(1.11) $\quad TIMING\colon\ t \rightarrow t_n \coloneqq n \coloneqq \lfloor (t-s){\cdot}f_c \rfloor$ is a surjective map of $\vec{\mathbb{R}}_{s+}$ on $\vec{\mathbb{N}}$,

[18] The integer function of real numbers $n = \lfloor t \rfloor$, is exemplified by $3 = \lfloor \pi \rfloor = \lfloor 3.14 \ldots \rfloor$