

kna**B** tutorial

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0.1 To the reader:

You're welcome to engage into short ad hoc discussions of **knaB** at any time, in your own mind or with others, these may be good exercises. However, for a **serious** discussion, you need to read the whole of this tutorial or else your *seriousness* would be silly (after all, you need to know what you want to talk about; don't be fooled by the familiar sounds of the words because—in the context of **knaB**—their meaning may differ from the ordinary drastically).

The *Introduction* (see Chapter 1 below) presents certain items, ideas, or facts related to **knaB**, which are explained only in *The definition of knaB* (see chapter 2) or later. It would make **no** sense to **seriously** discuss these items before reading at least the definition, but, preferably, a serious discussion should follow covering the whole tutorial.

Remark 1 *This tutorial at this time is not finished, sorry. I hope to continue or will provide more material (much more).*

Chapter 1

Introduction

Up to date of this writing, **knaB** is the most advanced single achievement of AoA (the *Art of Agreement*).

knaB is a financial system. It has advantages (and never disadvantages) even if **knaB** has only a few participants (the more the better). If **knaB** was adopted universally it would make the society prosperous. In general, prosperous society can be achieved only when it implements the one and only commandment:

1 *do not impose*

This implies following AoA which aims at implementing the commandment (the process of this implementing is dynamic—many people should contribute to it, and everybody should be open-minded).

1.1 **Name **knaB****

The word *knaB* stands for the opposite to *Bank*.

1.2 **The two components of **knaB**—**knaBers** and accounts**

There are exactly two components to **knaB**, and nothing more: **knaBers** and **knaB** accounts.

Thus, a **knaBer** is a person (any person, it can be a newborn too), and **knaB** accounts are similar to banking accounts—at any moment

(depending on the moment) there are some funds associated with each account.

Any adult person who is in possession of their senses can become a **knaBer** at any time (without any restrictions—if they wish so), and any guardian of a child or a person in their care may make that child or person a **knaBer**. There are no other **knaBers**, meaning in particular that organizations are not **knaBers**.

1.3 What are **knaB** funds *physically*?

Funds are simply decimal numbers (like, say, 5066.129), one per account. Each such number is called the balance of the respective account. These numbers exist exclusively in a software system.

1.4 First **knaB** advantages (already huge)

The **knaB** system has virtually no overhead. In particular,

- there are no **knaB** material *money*, e.g. no paper \$\$ nor coins (thus there is less to steal, to lose, or to forget)—there is no such costly operation;
- there are no **knaB** buildings, no offices, no **knaB**'s electric bills to pay, no sidewalks to maintain, ...
- **knaB** has no bank owners, no managers, no officers, no security guards, ...— there are only software **knaB** accounts;

1.5 Who is in charge of **knaB**?

Nobody is in charge of **knaB**. There is only a team of volunteers (4 to 6 people) who handle the technical computer aspects of the **knaB** operation. The team's membership changes in time. They would handle the software operation for arbitrarily large **knaB**, even if all people on Earth and around it are **knaBers** .

1.6 How to start a **knaB**? How to close it?

A group of willing people, including a voluntary team of about 4 to 6 computer specialists, can start a **knaB** at any time.

Once a **knaB** is created there is never any need to close it. Even when no more wanted it is still totally harmless. Anyway, **knaB** doesn't even exist as an organization which has a governing body to close it or to do anything about **knaB**.

Thus, **knaBers**—as individuals—may simply ignore their **knaB**. If a **knaBer** wants too they may withdraw from their **knaB** (as an individual) officially. However, once again, there is no advantage to withdrawing, there are only advantages to continue even as a passive **knaBer**.

1.7 One **knaB** or many?

People can start as many **knaBs** as they want to. It's better, though, to have larger **knaBs**, and actually the best would be to have one universal **knaB**. While there are advantages even to relatively small **knaBs**, only very large **knaBs**, preferably one universal **knaB**, will bring society prosperity.

1.8 Is negative **knaB** account balance possible? What about loans?

Negative **knaB** account balance is never possible. The **knaB** software system will not allow any account to go below 0.

Axiom 1 *A **knaB**'s account balance is never negative.*

Furthermore, **knaB** knows nothing about loans and borrowing. Outside and independently of **knaB**, some **knaBers** may arrange borrowing and loans among themselves (it would be legal). This however is strongly discouraged by AoA, it's against the spirit of AoA. This is so because borrowing and loans are harmful ideas which cause waste, abuse, anxiety, victimization and crimes. Borrowing and loans are immoral.

In the context of the social system today and of the past, the traditional related idea of *saving money* is considered a virtue. Actually, *saving money* is an unfortunate byproduct of the financial systems of today and of the many centuries in the past. The need to save money proves that the respective financial system is immoral.

1.9 The knaB's fund unit, etc.

Each knaB account balance is simply a decimal number. It is still nice to use name knabie for number 1 in the context of knaB funds, This way it's easier to see at one glance that we are talking about knaB funds and not about a school fourth grade arithmetic homework. Here are names for other knaB amounts of funds:

- milknab = 0.001
- centknab = 0.01
- dimknab = 0.1
- knabie = 1.0
- dekanab = 10.0
- hecknab = 100.0
- kiloknab = 1000.0

1.9.1 The average knaB funds per knaBer

We will see from *Definition of knaB* (chapter 2) that knaB satisfies the following

Axiom 2 *The total balance of the entire knaB is $N \cdot 10000$, where N is the total number of knaBers at any given moment .*

This means that the average funds per knaBer are ten kiloknabies, i.e. 10000. The number of knaBers may change in time (it is expected) but the average of the funds per knaBer will always stay the same, namely 10 kiloknabies.

When compared with the existing financial systems of today or from the past, this property of knaB cuts drastically on the potential of financial manipulations—especially that in the knaB universe there are no bankers.

The value of a knabie depends on one thing only—on the productivity of the society in terms of producing material goods, services and entertainment. The economy under knaB is self-propelling, meaning that when some people produce more than it is an incentive for others to produce more, thus earning the right to acquire the fruits of other people's work.

Under the existing financial system, people crave money so much that it is sick. Under **knaB**, funds are secondary, what counts is **work!** The work spins the wheels of economy, the funds only grease them.

Chapter 2

The definition of knaB

Taking into account the above Introduction (chapter 1), one may follow it with the definition of knaB presented below . This definition is simple, much simpler than any existing economic treatises. Nevertheless, it's not enough to absorb a profound definition (great as it would be). One needs to put a serious effort into understanding the knaB idea. It is simple but far from trivial. Thus beware—simple but not trivial. At the first, many readers will be shocked and would tend to disbelieve the idea while trying to stick to several false *truths* stated repeatedly in the past (actually).

Acknowledgement *JEHB made an important modification of the definition by faithfully preserving its meaning while simplifying its description (it's like formulating a mathematical theory with three simple axioms instead of four more complicated axioms).*

2.1 Local and global knaB operations

There are exactly two types of knaB operations: local and global. The global operations are also called *system operations*.

Axiom 3 *All knaB activities are archived forever.*

A local operation always involves exactly two different knaB accounts. Every single local operation consists of exactly one unidirectional transfer of some funds from one account to another. Thus an amount, say X knabies (where X is a positive decimal number), is withdrawn from one account, say account A , and **the same**

amount X knabies is deposited to another account B (different from A). This means that as the result of this local operation the total balance of the two accounts A and B , as well as the total balance of the whole **knaB** (i.e. the sum of all **knaB** accounts) stays the same.

Any financial operation between multiple **knaB** accounts must consist of a sequence of local operations. Any direct or immediate operation between more than two accounts is not a **knaB** operation—it must be decomposed into a sequence of consecutive transfers between two respective accounts.

The global **knaB** operations involve entire **knaB**, i.e. each such operation involves all **knaB**ers. Global operations will be described in *Global **knaB** operations* (see section 2.3).

2.1.1 **knaB** clock

The **knaB** system divides every day into two disjoint periods: the five minutes of the *global time*, and 23 hours and 55 minutes of *ordinary time*. Each day these two periods happen always at the same time of the day, and exactly at the same time over the entire Earth (please, do not worry about the Einstein's relativity theory).

Lets assume that the global time occurs from 23:55 to 23:59:59 according to Greenwich time. Then the clocks in New York will show **the same** period as from 17:55 to 17:59:59 according to the Eastern Time Zone..

The local operations (transactions between two **knaB** accounts) take place during the ordinary time but never during the global time. The global operations take place during the global time but never during the ordinary time.

Remark 2 *The **knaB** system parameters are significant only during the ordinary time. The parameters featured during the global time are auxiliary—they do not affect **knaB**ers at all, they just serve the computations of the significant parameters.*

Terminology 1 *The moment just before the global time period is called the end of a **knaB** day, and the moment just after the global time period is called the beginning (or start) of a **knaB** day.*

2.2 Personal and general **knaB** accounts

There are exactly two different types of **knaB** accounts: *personal* and *general*.

There is exactly one personal account associated with each **knaBer**, i.e. basically, each **knaBer** owns exactly one personal account, and there are no other personal accounts.

On the top of personal accounts, **knaBers** may create individually or jointly any number of general accounts. The **knaB** system is not aware of the relations between **knaBers** and general accounts. All that **knaB** knows are transactions.

Remark 3 *There may be all kind of non-**knaB** software systems which assist the relations between **knaBers** and general accounts, e.g. there can be different kinds of authorizations for different co-owners of a general account, etc., but **knaB** would know nothing about them, it only knows one **knaB** password per account.*

*Once again, **knaB** would not know if a password was directly provided by a **knaBer** or by a software system.*

2.3 Global (i.e. system) **knaB** operations

There are three kinds of system operations, **knaB** performs them each day (during the global 5 minute period) in the following order:

1. Removing a **knaBer** or an account (one at the time, if any).
2. Admitting a new **knaBer** (one at the time, if any).
3. Daily update of all **knaB** accounts.

One of the first two tasks, or both, can be vacuous on any given day.

2.3.1 Removal

A **knaBer** is removed if and when their death is reported or the **knaBer** resigned their **knaB** memberships (a silly thing to do but legal).

Remark 4 *By that time the **knaBer** and/or their family and/or their friends perhaps made certain financial arrangements earlier.*

*However, **knaB** system will perform only the steps listed below, and not more; it will do so during the nearest global period. Also, remember that all **knaB** activities are archived (see Axiom 3).*

Let the number of the remaining **knaB**ers be N , and let the balance of the removed **knaB**er's personal account be X (i.e. X knabies). Then, at this very moment, the temporary **knaB** total balance is $(N + 1) \cdot 10000 - X$. Thus this is what happens:

1. the personal account of the **knaB**er is removed;
2. The remaining (i.e. the still existing) general and personal accounts are recomputed in two steps:
 - (a) the **knaB** system deposits $Y := \min\left(10, \frac{X}{N}\right)$ to each of N personal accounts;
 - (b) the just obtained new temporary balances, all of them (personal and general) are now adjusted proportionally so that the total of all accounts (i.e. of the **knaB**) would equal to $10000 \cdot N$ (see Axiom 2).

2.3.2 Admission

Every person who can make conscious decisions or their guardian can get accepted by **knaB**, no questions asked. Then, afterward, during the first global occasion, that person gets their personal account, and 10000 knabies (ten kiloknabies) are deposited to the new account. Let's recall that the average **knaB** balance per knbb will again stay at the ten kiloknabies level (see Axiom 2).

2.3.3 The daily **knaB** update

During the daily global time, after **knaB** is done with the removals and admissions, the **knaB** system deals with the temporary account balances. Nevertheless, at this moment the total sum of balances of all **knaB** accounts (general and personal) is equal to $10000 \cdot N$, where N is the number of all **knaB**ers (cf. Axiom 2). Then, **knaB** modifies these accounts as follows:

1. the system shrinks all accounts (general and personal) by 0.1%; thus, temporarily, instead of a balance X the respective account will hold $\frac{999}{1000} \cdot X$ knabies.

2. Now **knaB** deposits 10 knabies (a deka**knab**) to each personal account.

That's the end of the daily update operation. After these two steps the total **knaB** balance is $10000 \cdot N$ again (cf. Axiom 2).

Remark 5 *Every **knaB**er will have at least 10 knabies at the beginning of every **knaB** day.*

Chapter 3

Bums and more

3.1 Low knaB income

Define a knaBer income as the knabies they get from knaB accounts, and not from the knaB system (i.e. not from the daily updates or as the result of closing some knaB accounts)—thus this would be an income received only during the knaB regular time

There might be knaBers who work, and work usefully, e.g. some housekeepers, whose knaB income is low (or even zero). There are still more people who work, possibly intensively, but exclusively, or nearly exclusively, in a barter mode. All this would be legal under knaB system or, more generally, along AoA. Thus there may be knaBers whose knaB income is low but who work, possibly who are materially well-off.

The other low income knaBers are children, some students, some of the handicapped people, some artists and scientists, etc.

Finally, why not, there might be among knaBers simply bums.

Thus let me introduce some tongue-in-cheek but serious terminology:

Terminology 2 *A knaBbum is a knaBer who at the end of a knaB day didn't earn any knaB funds during the regular time of that day, their knaB income was 0..*

You may be a knaBbum for one day (say on weekends), and not on another. This *knaBbum* is a daily title, it's not permanent.

3.2 The effect of the daily update

Discussion 1 *At this point of discussion, and for the sake of argument, let's ignore the knaB 's removal option (see subsection 2.3.1)–let's pretend that no knaB accounts are ever removed.*

In practice, removals affect the remaining accounts only to a negligible degree—they favor those who have little in terms of knaB 's funds.

A knaBer whose total funds, just before the daily update, are X knabies will have a total of

$$X' := 10 + 0.999 \cdot X$$

knabies after the update, i.e. at the beginning of the next knaB day.. This means that your gain/loss as the result of the daily update is:

$$\Delta := X' - X = 10 - 0.001 \cdot X$$

- If you're a knaBer then you gain at the most 10 knabies—this happens if you're a *total knaB bum* that day, meaning that your total knaB fund is 0 at the end of the respective knaB day;
- you gain from the daily update as long as your total knaB funds are below 10 kiloknabs.
- the daily update doesn't affect you at all $\Leftrightarrow \Delta = 0$, i.e. if the total of your daily funds was equal 10000 knabies (ten kiloknabs);
- your total sum of funds becomes lower when your funds are above the average, i.e. above ten kiloknabs.

3.3 Dynamics of inactive accounts, general and personal.

An account is *inactive* during certain period of time if during that time this account was not involved into any local operation (see section 2.1), i.e. when this account didn't participate in any transaction between two accounts.

For the sake of simplicity, we still pretend here that **knaB** accounts are never removed. In realistic cases, the impact of removals is negligible (see *Discussion* re**fbumAdv**).

3.3.1 Inactive general accounts

Let's consider a general account which at a given moment became inactive and has a balance of $X_0 = 100$ knobies (i.e. hecknab). In one year or in 365 days the balance will be only:

$$X_{365} = 100 \cdot 0.999^{365} = 69.407$$

(minus small change of 0.000011 ...).

We see that the daily updates act on the general accounts like an income tax or negative yearly over 30% interest—very high (however, for a strategic reason, we don't have any tax under **knaB**, see section 3.4).

After a 1000 days (clearly under 3 years), the daily updates will shrink the initial hecknab to about $\exp(-1) \cdot X_0 = 36.7879\dots$ or more precisely to

$$X_{1000} = 100 \cdot 0.999^{1000} = 36.7695\dots$$

And after 10000 (ten thousand) days or just under 27.4 years barely a small fraction of a knobie will remain:

$$X_{10000} = 100 \cdot 0.999^{10000} = 0.004517\dots$$

If an inactive account had at one moment a solid balance of $Y_0 = 10000$ knobies (ten kiloknabs—this is the average total balance per **knaBer**) then in 10000 days it will shrink to $Y_{10000} = 0.4517\dots$, which is less than half a knobie (things are proportional). After full 30 years, which is 10957 day (sometimes plus/minus one day) we get $Y_{10957} = 0.1734\dots$ or under two dimknabs.

3.3.2 Inactive personal accounts

Consider a **knaBer** who, at one moment, has on their personal account exactly 10000 knobies (i.e ten kiloknabs), and who lket this personal account stay inactive. This may easily happen to a newborn. This inactivity may happen for various reason, but anyway, this account will stay always at the same level, its balance will be

always 10000 knabies (as long as the account is inactive). That's how the daily update works.

In general, when at a certain moment a personal became inactive, with a balance X_0 at that moment, then the balance of this personal account will converge monotonously toward ten kiloknabs, and it will do so a brisk pace for a while until it becomes virtually stable (near the $X_n = \text{ten kiloknabs}$ level). Let's illustrate it on two different examples.

Example 1 Consider a personal account for which the balance was $Z_0 = 0$ (zero) at a certain moment from which on the account became inactive. After a thousand days the balance will be:

$$Z_{1000} = 10 + t \cdot 10 + t^2 \cdot 10 + \dots + t^{999} \cdot 10$$

for $t := \frac{999}{1000}$. This is a geometric progression, hence

$$Z_{1000} = 10000 \cdot (1 - t^{1000}) \approx 10000 \cdot (1 - \exp(-1))$$

We see how close is tis balance to the average 10000, already after a 1000 days only. The more precise value is:

$$Z_{1000} = 6323.04575\dots$$

After 4000 days (in just under 11 years) the value will be:

$$Z_{4000} = 10000 \cdot (1 - t^{4000}) = 9817.2098\dots$$

real close to the average 10000; etc.

In general, value Z_n stands for

$$Z_n = 10000 \cdot (1 - t^n), \quad \text{where } t := \frac{999}{1000} \quad (3.1)$$

Example 2 Consider a solid personal account of $Y_0 := 50000$ knabies, i.e five times the average (fifty kiloknabs), which from the given moment became inactive. Then after a 1000 days the value gets reduced to:

$$Y_{1000} = 50000 \cdot t^{1000} + Z_{1000},$$

where Z_{1000} is as in Example 1 (or see the general equation 3.1).
Explicitly,

$$Y_{1000} = 18384.7712 + 6323.04575 = 24707.81699$$

After another 3000 days, i.e. after nearly eleven years total, the consecutive value will be:

$$Y_{4000} = 50000 \cdot t^{4000} + Z_{4000} = 10731.16079$$

thus, not much above the average ten kiloknabs; etc.

3.4 knaB's daily updates vs. governmental income tax.

Chapter 4

Odds and ends

4.1 Inactive accounts