

kna**B**

Włodzimierz Holsztynski

December 11, 2015

Contents

1	Description	2
1.1	two kind of accounts	2
1.2	Two kind of operations	3
1.3	Individual operations	3
1.4	System operations	3
	1.4.1 Admitting a new knaBer	4
	1.4.2 The removing operation	4
	1.4.3 The daily reload	4
1.5	Inactive funds	5

Chapter 1

Description

1.1 two kind of accounts

1. A **knaB** consists of persons, called **knaBers**, and of accounts. Each account consists of one positive real number (e.g. of a number like 107.2555; then we say that the balance of such account is 107.2555 or 107.2555 knabies, where one knaby is simply number 1). The accounts reside on Internet. The whole **knaB** is handled by 4 to 6 software engineers.
2. There are only two types of accounts: personal and general (they are disjoint—a personal account is not general, nor vice versa).
3. There is exactly one personal account per knaber.
4. **knaB** knows nothing about any relations between the general accounts and persons (it's up to the people).
5. The total balance of all **knaB** accounts is always $10000 \cdot K$, where K is the number of all **knaBers**. Thus the total **knaB** balance may change when the number of **knaBers** changes, while the average balance per **knaBer** is always the same, it is 10000 (ten thousands).
6. The balance of a personal account is always positive, and it never exceeds 10 (ten knabies).

1.2 Two kind of operations

There are exactly two types of **knaB** operations: individual operations and system operations.

1.3 Individual operations

1. An individual operation is always between two different accounts; it is a transfer of some funds from one account to the other (so that the sum of the two balances stays the same).
2. A new general account can be created as a result of an individual operation; the created account will then have the balance equal to the funds transfer to it from the former account.
3. The amount to be deposited from one account to another cannot exceed the balance of the former account at the time which is about to precede the operation. When the balance of the former account is 0 (zero) after the operation then this former account gets closed. In the case when that former account is personal then zeroing it causes the **knaBer** to be removed (typically due to the death or expected death of the **knaBer**).
4. An individual operation can deposit funds only to a general account, never to a personal account. (It seems practical for a **knaBer** to have one general account just for that **knaBer**; s/he may own or participates in several other general accounts as well; once again, **knaB** knows nothing about the associations between the general accounts and **knaBers** or any other people).
5. It goes without saying that several individual operations may amount in effect to a more complex operation.

1.4 System operations

1. There are three kinds of system operations:
 - (a) Admitting a new **knaBer**.
 - (b) Removing a **knaBer**.
 - (c) Daily upload of personal accounts.

2. All system operations are performed at the end of **knaB**'s days—each day in the following order:
 - (a) admitting the new **knaBers**, one at the time (if any);
 - (b) removing respective **knaBers**, one at the time (if any);
 - (c) daily upload of personal accounts;

1.4.1 Admitting a new **knaBer**

1. The **knaB** system may admit a new **knaBer**—typically, it may be a newborn. Identify this new **knaBer** uniquely as, say, *XXZZ*. Member *XXZZ* must be different from any other earlier **knaBer**.
2. At the end of a **knaBer**'s first day exactly two new accounts are created, both owned totally by **knaBer** *XXZZ*:
 - (a) a personal account, call it *XXZZ_P*, with the initial balance 10 (ten **knabies**);
 - (b) a general account, call it *XXZZ_G*, with the initial balance 9990, so that the total of *XXZZ_P* + *XXZZ_G* balances initially will be 10000 (ten thousand **knabies**).

1.4.2 The removing operation

1. A **knaBer** is removed from the **knaB** system at the end of **knaB**'s day when their personal account is zeroed. There is no material gain to a **knaBer**, when they do so. Typically, this happens when a **knaBer** dies.
2. When thge personal account is zeroed then at the end of the **knaB**'s day all general accounts are shrunk proportionally so that the total sum of all accounts (personal and general) will be $10000 \cdot K$, where K is the number of all **knaBers** without counting the one who is in the process of being removed.

1.4.3 The daily reload

At the end of the day the balance of each personal account becomes 10 (ten **knabies**), and all general accounts are shrunk proportionally so that the total of all accounts (personal and general) will be $10000 \cdot K$, where K is the number of all **knaBers** at the time (i.e. the total

sum of all general accounts will be shrunk to $9990 \cdot K$ at the end of the day).

1.5 Inactive funds

Some funds within the general accounts may be inactive, meaning that they are never spent. For instance, this may happen when a knaBer's death is unreported.

Observe that the inactive funds, whether they amount to full general accounts or only to a part of a general account, diminish at a pretty fast rate, so that after a 1000 days only about $1/2.7$ (a little bit more than $\frac{1}{e}$ part is left. Thus after 3000 days (clearly less than 8 years) only about 0.05 part will be left (about five percent).

Nevertheless, when it would be proper, a knaBer should be removed as soon as possible. Also the personal accounts of the knaBers to be removed should be zeroed, and thus they should not exist anymore.