

SOFTWARE FOR SYNTHESIS INFRARED FILTERS FOR A GIVEN WAVEBAND RANGE

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I. Formulation of the problem

Calculation of constructive parameters of infrared (IR)-filters on the basis of a mathematical model for given environmental parameters are intensive process, so the task of creating and optimizing computing system that provides relative - linear performance gains by increasing the capacity of the hardware is currently relevant practically and theoretically important [2].

II. The purpose of the work

The purpose of research is building a mathematical model and software implementation of distributed computing for any configuration of hardware, using matrix method of modeling the infrared filters for a given waveband range.

III. The overall structure of software system

The software complex is divided into 5 modules, each performs its specific function/Unit R (Resque) – a special unit to handle exceptional situations, which present in each other type units for autonomy and stability of the system. So, in each basic module (DM, Q, C, UI) is present a recovery unit.

In fact, this unit recovers the program work at disappearance of network or at problems with control and interaction units (DM, UI, Q). If the system loses connection to the control unit, in each instance of the system are activated recovery modules, which begin the process of electing a new leader – the control unit.

The algorithm is a modified version of the Round-Robin algorithm - in order to decentralize management of elections, each program during the first connection to the system is processed by priority, which depends on the amount of available RAM and CPU resources.

Therefore, units with higher priority have the opportunity to become a leader earlier than units with lower priority. So, in case of losing “leader” system selects a new one, which will be the most powerful on available resources.

Algorithm of election new “leader” (Figure 1):

1. Unit reads its priority from system variable.
2. Wait for 30 seconds, checks whether the announced new "leader", if so - initiates the process start counting unit - module C.
3. If no – checks waiting time for “leader”.
4. If the time is over, and the new "leader" is not declared, the program declares himself as leader through broadcast IP-address and initiates launching leader units - DM, UI, Q.

In view of this software system, we can say that its performance can be expanded with the addition of computing units, and this possibility should be investigated in practice.

As the queue management system has been chosen RabbitMQ technology, as the fastest among counterparts with similar functionality. Client side is written by HTML, CSS, Twitter Bootstrap, JavaScript, JQuery. Server side implemented by using such technologies as Free Pascal 3, Java 8, Apache Tomcat, Vertx.io, Google Guava, JNA, Apache Commons Math, Lombok, Bash, Docker.

Conclusion

Performed software implementation of a distributed algorithm of synthesis infrared filter for a given waveband range and presented modified algorithm distribution Round-Robin tasks for decentralized solution of "leader" election problem in the system.

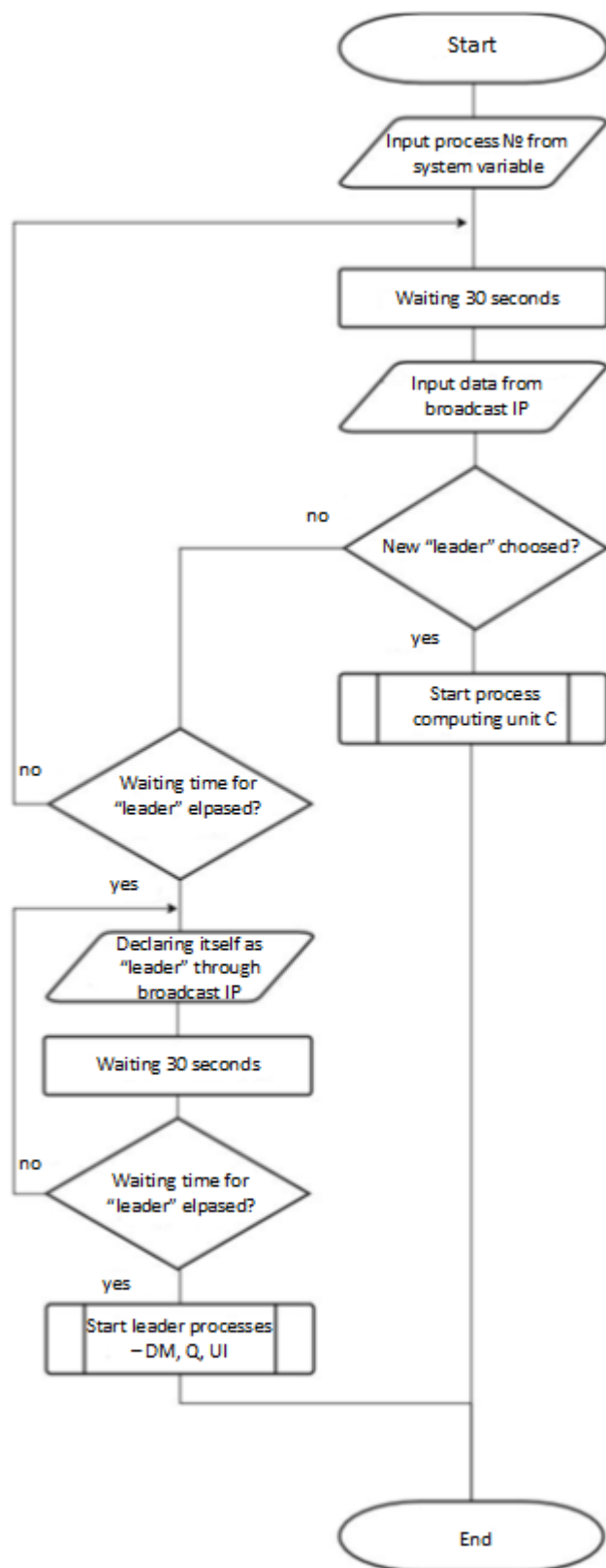


Figure 1- Algorithm of election new "leader"

References

1. Moiseev TN, Distribution of information flows of data in distributed multi-server systems / Moiseev TN-Voronezh: Scientific Book, 2015. - 145 p.
2. Konakhovich G.F. Packet data transmission networks / G.F. Konakhovich, VM Chuprin. - Kiev: "MK-Press", 2012. - 272 p