1. Introduction

There are various software methods of increasing the productivity of informational systems (IS) based on using of relational data bases (RDB). One of them anticipates using materialized views (MV) [1 – 6]. MV stores result of certain request to the data base (DB) and at following entry of this request to the IS allows getting answer very fast. However the practical use of MV in separate IS is impossible without preliminary study of this IS. As MV is a result of request which uses number of BD tables the refreshing of certain data in those tables leads to necessity of refreshing MV too. At frequent refreshing of data the using of MV could not increase but decrease the effectiveness of IS [7].

In a books [8, 9] the way of determining of those requests for which the using of MV will be effective on the basis of RBD requests consequence analysis is shown. AT this we consider that MVs in future will be connected permanently.

In this book the periodical connection and disconnection of MV is offered.

The basis for this is an evident periodicity in resolving of different tasks for the most of organizations. For example, there is a period of admission, passing the tests, and visiting hours in the university. In trading companies the periodicity of goods income, residues inventories, revaluation and sales out, seasonal variations in assortment and working hours is observed. The periodicity of resolving of production objectives is reflected in periodicity of requests incoming to the system.

2. Advantages of MV management

Periodical connection/disconnection of MV will allow to increase its effectiveness due to following factors.
1. Possibility of disconnection of some MV during period when it’s using is non-effective.
2. Possibility of initiation into service of MVs which became non-effective at continuous connection but which are effective during certain periods.
3. Lowering of DBMS resources spent for servicing of MV mechanism due to implementation of effective MVs at now only.

3. Reasoning about efficiency of MV

Let us assume that Q is a consequence of requests being sent to the IS during period of observation $t_0$. There are $n_i$ requests of $q_i$ form and of SELECT type in this consequence. To determine the possibility of forming MV for requests $q_i$, introduce the term «effectiveness Mpi» (materialized view for request $q_i$), specified as relation of all $q_i$ requests execution time without implementation
of MV to the time of all \( q_i \) requests execution time with implementation of MV.

\[
E_{c_i} = \frac{S_0}{Smpt + Snwrt + Ssel},
\]

(1)

where \( S_0 = \sum_{j=1}^{n} t_j \) — total time of all \( q_i \) requests execution during observation period \( t_0 \) without implementation of MV;

\( Smpt = n * t_{mp} \) — total time of all \( q_i \) requests execution with implementation of MPi;

\( Snwrt = k_t * t_{sw} \) — time of MPi refreshes during \( t_0 \). Here \( k_t \) is a quantity of MPi refreshes which is determined by number of UPDATE, INSERT and DELETE requests which changes the data in basic tables affecting the value of MPi.

\( t_{mp} \) — average time of refresh MPi.

\( Ssel = n * t_{mp} \) — time being spent for choosing the requests having MV from common flow of requests. Here \( n \) is a quantity of all requests came into DB during time of observation \( t_0 \), \( n_{mp} \) is a quantity of MVs being used.

Let us introduce the term of effectiveness of managed implementation of MV. At this we will call the time interval during which MPi is connected for the time \( t_1 \) (connection period) and then is disconnected for the time \( t_0 \) (disconnection period) as management period.

\[
E_{t} = \frac{S_0}{Smpt + Snwrt + Ssel + Sbd},
\]

(2)

where \( Smpt \) is a total time for all \( q_i \) requests execution which are in periods \( t_1 \).

\( Snwrt \) is a time of MPi refreshes during \( t_1 \) periods.

\( Ssel \) is a time of MPi refreshes during \( t_1 \) periods.

\( Sbd \) is a time being spent for choosing the requests having MV from common flow of requests. Here \( n_{mp} \) is a quantity of MVs being implemented taking into account the introduction of connection/disconnection mode \( (n_{mp} < n_{mp}) \).

Relative assessment of some management period effectiveness \( E_{t_i} \) is necessary for assessment of this period but not allow estimate the «deposit» of this period to total effectiveness MPi. To estimate the «deposit» of each management period and determinate the end of new management periods search process let us to introduce the absolute estimates of effectiveness specified by reducing the time for requests execution.

In accordance with (1) we will obtain reducing of time at constant connection of MPi - \( \Delta t_c \).

In accordance with (3) we will obtain maximum reducing of time at selective connection MPi - \( \Delta t_{max} \).

In accordance with (4) we will obtain reducing of time at choice of certain management period MPi - \( \Delta t_{i} \).

The basis of management periods and corresponding connection \( t_{1i} \) and disconnection \( t_{0i} \) periods search method is a repetitive process which ends when value of total reducing of time at periodical management MPi.

\[
\Delta t = \sum_{i=1}^{m} \Delta t_{i} = \Delta t_{max},
\]

(5)

or there is no possibility for addition of new management periods, for example, increasing \( m \) is impossible for existing value of observation time \( t_0 \).

6. Determination of management periods on the basis of work schedule of organization

In real informational system the periods of MV management could be linked with work schedule of organization that is to the working hours, day of week, date of month and so on. In addition, depending on particular characteristics of organization profile the specialized methods could be in-
troduced, for example, 3 days before each month end, 5 days before each quarter end etc.

On the basis of IS operation analysis and convenience of MV management it is convenient to choose one hour as the shortest period of connection. Let us to introduce the numbering of IS working hours from the moment of beginning of working day. Based on the above the first period of management is offered to be set the week and period of connected state Mpi is a first hour of Monday. Then with saving of management period we set the connection period Mpi as second hour of Monday and so on. While process continue all hours of each day of the week are processed consequently with saving the period which is equal one week.

For each day an hour on the basis of (4) the effectiveness is calculated

\[ E_{\text{Work},DJh} = \frac{\sum_{i=1}^{n} E_{\text{Work},DJh,i}}{n}, \]

where n is a quantity of weeks entered in observation period,

Dj is a day of week,

Hk is a number of hour of working day.

The days and hours used for calculation of three values of effectiveness E_{\text{Work},Monday,1}, E_{\text{Work},Tuesday,3}, E_{\text{Work},Wednesday,4} are specified in tabl. 1.

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The results of calculations are convenient to be represent in view of matrix of management Mpi, where each cell has 0 (corresponds to value E_{\text{Work},DJh} \leq 1) or 1 (corresponds to value E_{\text{Work},DJh} > 1).

There is a conclusion from tabl. 2 particularly which MPi could be connected in Monday during 1st and 2nd hour as well as during 6, 7 and 8 hour.

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The correcting of management MPi taking into consideration of study of more long-time management period.

Limitation for duration of management period being analyzed is made by observation time \( t_0 \) for operation of AS. It is recommended to limit the duration of longest management period by value of \( t_0 / 2 \).

This assessment together with (5) is a condition of new management periods search process end.

The duration of management period could be increased according to the results of observation for IS during time of system maintenance at condition of continue of requests consequence studying.

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7. Conclusion

The analysis of requests consequence came into automation system having been performed had allow determine the requests which are profitable to connect at constant basis and other requests should be connected periodically.

Total time of requests execution was decreased. MVs being connected periodically in period of intense reports preparation allows avoiding of peak loads on the system.

Developed method of MV management could be used in many organizations where the certain periodicity of tasks being executed is observed.
МЕТОДИКА
ОБОСНОВАНИЯ
ОРГАНИЗАЦИОННО-
ТЕХНИЧЕСКИХ
МЕРОПРИЯТИЙ ПО
СОВЕРШЕНСТВОВАНИЮ
ЭКСПЛУАТАЦИИ
КОРАБЕЛЬНОЙ
ТЕХНИКИ

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1. Введение

Проблема аварийности и ее предупреждения остро стоит перед всеми флотами мира. Особенно эта про-
blemа актуальна для кораблей и судов Военно-Морс-
ких Сил Вооруженных Сил Украины (далее – ВМС Украины), так как у большинства из них закончились
нормативные сроки эксплуатации. Проблема также