

Enhancing the Effectiveness of Asset Management through Development of License Management System on the Basis of SCCM 2012 Program by Microsoft Company

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Abstract: In modern organizations specific software is widely used. This fact is the background for one of the most urgent issues in the activity of any organization: whether currently used software complies with the terms of license agreement. In many companies the set of licenses bought for the use of software doesn't not correlate to actual installations on users' computers. This is the very reason why companies are not protected from possible discrepancy of bought and installed licenses, in spite of considerable budget investments. Such a discrepancy causes financial, legal and other risks. This study reveals the deficiencies of available approaches to the construction of license management system. It contains method guides developed for removal of identified deficiencies in the available approaches to the construction of license management systems. Integrated innovative system of management and accounting of licenses was developed, which corresponds to all methodological recommendations, developed on the previous stage. This system makes it possible to build transparent interrelations between software installed in the company and bought license for the use of software under consideration, which gives us the opportunity to observe strictly intellectual property law. The developed system has been implemented and frequently used in a large Russian company since June 2016 by this day. The article shows the results of exploitation period and confirms consistency of the developed system as the management tool of the licenses for the use of software.

1 INTRODUCTION

The vast majority of modern business processes in companies are implemented due to use of different software. Such software is very often licensed, which causes legal and financial risks of the company, as this software can be used incorrectly. This problem is of much importance for large high-tech innovative manufacturing methods, which are the basis of innovative development of any society (Korableva and Litun, 2014). Every year big companies all over the world spend million dollars for regularization of relations with proprietors (BSA Global Software Survey, 2016). The technology of license management (Software Asset Management, SAM) has being developed and improved for more than 20 years. Different license management

systems have been developed and a lot of SAM projects have been implemented during this period. License management should be understood as the process with clear understanding of quantity of licenses bought for the use of specific software, quantity of current installations of computers of the organization and the awareness of the situation of under and over licensing, etc. (Korableva and Kalimullina, 2014).

The present study was determined by the urgent need of innovative companies for the development of a system which could solve all current problems in the calculation of license software installations, such as 1. The calculation of the quantity of installations, based on the number of appointed licenses, but not on the number of actual installations. 2. The calculation of number of installations, received by one type of inventory only.

For the solution of this problem the authors undertook the study of theoretical section in the field of license management and developed methodological recommendations, which made it possible to remove identified deficiencies in the available approaches to the construction of license management system (Korableva and Kalimullina, 2016a). The next stage of the study was the development of software program, which would comply with identified methodological recommendations. Since June 2016 through present the system has been implemented in a big company and is frequently used by system administrators, assets managers as well as company management. This system enables all the concerned parties to get reliable information about potential hazard of breach of license agreement, consolidated data on bought licenses for the use of software, the opportunity to reduce costs for the use of software.

The stages of undertaken study are shown in the logic of this article composition.

2 THEORETICAL BACKGROUND

2.1 Related Works

One of the first publications in the field of license management was devoted to the study of automated metrics of software, the assessment of CIM repository and management of software assets (Banker et al, 1991). Just in several years the interest in the field of license management shifted to legal, ethic and management issues of piracy and anti-piracy campaign (Holsing and Yen, 1999; Avila et al., 2011; Kim et al., 2014; Avila and Garces, 2014). The series of scientific publications revealed nuances of financial risks in case of license agreements breach (Luxembourg and Sommer, 2013; Dzerzhinskiy, 2012).

Together with the issue about illegal use of software the issued about its structural description were brought up (Subramanian, 2000; Nouh, 2016), the discussion of which stimulated the development of approaches to automated management of software assets (Mendoza, 2015). Further the cases of SAM-project implementations in the specialized fields were considered (Alegre et al., 2016; Cecconi et al, 2016). New technologies and protocols for the supply for projects implementation and assets management by appropriate means were developed (Paukeretal., 2016; Swanson, 2017; Mullakhmetov

et al., 2016; Korableva et al.,2017). Scientific articles describing researches in the field of methodology of systems development, used in the process of check for correct use of license software (Verma and Ramanathan, 2012; Faisal and Mardiyanto, 2014; Ligon and Wallace, 2017). These articles describe principles which allow focusing on actual software installations, especially the use of data of company devices inventory (Bugajski, 2016; Saxena et al., 2017; Korableva and Kalimullina, 2016 b). In spite of extensive studies in the field of implementation of license management projects, as well as studies in the field of development of systems, which simplify the execution of some stages of these projects, there are not so many publications dealing with current problems in the calculations of license software installations.

Thus, this study reveals the aspect, which hasn't been clarified before. The software solution offered by the authors make it possible to eliminate current problems in the work with license management systems.

2.2 The Problems of Standard Approach to SAM

The works on conformation of bought licenses for the use of software to actual installations of this software are customary divided into 5 stages: software inventory; software standardization; conformation; construction of software IT-assets management in the organization. Methodological background of such division is founded in a new version of standard MC ISO/IEC 19770-1:2012. The stages of the standard describe ideal algorithm of software assets. Nevertheless, hidden rocks are found at every described stage.

Moreover, after implementation of such SAM project software assets of the organization are in proper condition only for a restricted, frequently brief period of time. New programs/versions of existing programs are produced, and inventory data, collected at the first stage become invalid. As the period of execution of all the above mentioned stages may vary from several months to a year, the order in the condition of software assets may be broken just in the process of execution of works on SAM project.

Moreover, constant accounting system of licenses doesn't show the data about all bought licenses and all types of software, used in the company. The process of management of software life cycle doesn't prevent from the situations of self installation of software by the users of the company,

which causes unsynchronization of real condition of software assets of the company with determined procedure.

On the basis of the above mentioned situation you can draw a conclusion that implementation of SAM projects is not a cure-all solution of breaches license agreements with proprietors. The above mentioned problems can be solved by the system of license management, which can carry out at least first 4 stages in real-time mode.

2.3 Approaches to the Arrangement of Calculation of Installations in License Management Systems

Modern systems of license management according to their structure, as well as the principle of work performance on the whole are identical. Fundamental difference consists in the approach to the calculation of quantity of installations of defined software. Thus, you can single out 2 main approaches:

1. The approach based on assignment of licenses to users or devices.
2. The approach based on the use of only one type of inventory.

In the first case only theoretically authorized installations of the software under consideration are taken into account. Nevertheless, as practice shows users can install desired software themselves without notifying company administrators about it. In this case the quantity of actual installations exceeds the number of authorized ones.

The main problem is that the responsible persons can't see this difference. In such case after the visit of auditor the company frequently has to pay fines, which significantly affects its financial situation. In the 2nd case installations which could be identified by another type are not taken into account. The difficulty consists in the fact that auditors from different vendors use as the source of information various inventory types. As practice shows the data on installations of the software under consideration, received by means of software inventory weakly correlate to the data received by means of file inventory. The difference between these two digits can be tremendous.

Thus, in this case if the auditor uses wrong inventory type as the source of information, with the help of which calculation of software installations is made, there is a good likelihood that the quantity of installations found by the auditor, won't coincide with the number of installations found by the

company itself. In this case if the auditor found more installations, the company should pay fine.

3 METHODOLOGY

The main aim of the project is development of license management system on the basis of SCCM 2012 for the supply of management function and control of software licenses.

Within the project development of the following functional capabilities is carried out:

- Identification of installed software;
- Commitment of license models and rules of use of programs;
- Correlation of data on licenses with the data on workstations inventory;
- Getting of reports.

The use of data of both software and hardware inventory are offered. Every unit of licensed software should be described from the point of view of executive files, which correspond to this software, as well as from the point of view of the names displayed in the control panel, that is Installation/Deinstallation of programs.

Information on executive files of the software under consideration is contained in the data of software inventory. Information on names, which correspond to licensed software under consideration, is contained in the data of hardware inventory.

By means of description of every unit of licensed software from the point of view of indicated two types of data reference sample of properly registered installation. Comparison the data on actual installations with the described reference sample will make it possible to identify legal installations (which correspond to the described reference sample), as well as illegal installations (which don't correspond to the described reference sample).

Legal installations of software will be displayed on the computers, where indicated executive files of the software were found, and where one of the names indicated in the Control panel was registered, that is Installation/Deinstallation of programs.

Thus, the system will provide the opportunity to get data on proper legal installations of the software under consideration, as well as the data on computers, where this software is installed from the hacked installer or temporal version.

The offered method levels all current problems existing in the approaches to calculation of installations in license management systems, more specifically:

- Calculation of the quantity of installation on the basis of the number of assigned licenses, but not on the quantity of actual installations;
- Calculation of the quantity of installations, based on the data, received by means of one type of inventory only.

4 RESULTS

4.1 Description of the Architecture of the System

The system presents the collection of 3 cross-integrated components, either of which provides with definite functional opportunities:

- Module of licensed software accounting
- SCCM 2012
- SQL Server

4.1.1 Module of Licensed Software Accounting

Module of licensed software accounting has a client-server architecture and is a combination of web-interface and program code, which determines logics of module functioning and provides integration of this module with the rest components of the System. The server part of the module presents the following elements:

- Contracts
- Licenses
- Sets
- Reports
- Settings
- Notifications

Contracts

Logic element of the module of licensed software accounting, which describes concluded contract for supply of licenses. The list of parameters of the contract: name of the contract, date of conclusion, ID in Monolit, supplier, connection with licenses.

Licenses

Logic element of the module of licensed software accounting, which describes bought licenses for the use of specific software. The list of license parameters: Name of the license, SCU, Vendor, Type of licensing, Quantity, Expiration time, Note, Cost in rubles, Cost in currency, VAT, Territory, Country, Business customer, Previous licenses, Connection with the sets of software, Connection with the contract.

Sets

Logic element of the module of licensed software accounting, which describes licensable software on the basis of data from software and file inventory SCCM 2012. The list of parameters of the set: Name of the set, Is OS, Installed software, Licenses.

Installed Software

Parameter “Installed software” of the element “Sets of software” has the following structure: Information on the software on the basis of data of hardware inventory; Information on the software on the basis of data of file inventory; Information on the program; Information on the files of the program.

Reports

Element of the module of licensed software accounting, which is the section with the list of reports in SCCM 2012, build on the basis on Reporting Services. The list of reports: Summary data on installation of licensable programs, The list of computers with legally installed program, The list of computers with illegally installed specific program, Tendency of licensable programs use, List of licenses, The list of licenses with expired time, Parameters of a specific license, The list of sets, Parameters of a specific set, The list of contracts, Parameters of a specific contract.

Settings

Element of the module of licensed software accounting, which is the list of reference books, used in the process of work with other elements of the System. The list of reference books: types of licensing, countries, territories, vendors, suppliers, business customers, responsible for purchases, categories of files.

Notifications

Element of the module of licensed software accounting, which contains the following modules:

1. The module of notification about license expiry;
2. The module of notification about discovery of the software, which was not described.

4.1.2 SCCM 2012

Within the system SCCM 2012 provides with the following functional capabilities: Inventory of the installed software, Reports modeling.

Inventory of the Installed Software

Program SCCM 2012 gives the opportunity to make 2 types of inventory: Hardware inventory and File inventory

Reporting System

The System reports are implemented with the help of SCCM 2012 on the base of Reporting Services.

4.1.3 SQL Server

The component of the System provides the following functional capabilities:

- Arrangement of work of SCCM 2012 database
- Arrangement of work of SAM database
- Setting of tasks

Arrangement of Work of the Database of SCCM 2012

Within the developed System the following list of presentations of SCCM database is used:

v_GS_INSTALLED_SOFTWARE

v_GS_SoftwareProduct

v_GS_SoftwareFile

Arrangement of Work of SAM Database

SAM database consist of the series of tables, intended for recording, reading and storage of the System data according to the following components of its server side:

Contracts. Information on contracts is stored in the table SAM_ContractCatalog. Triggers are used for

dynamic data updating of the table SAM_ContractCatalog. The series of procedures are used to provide recording and updating of contract data.

Licenses. Information on bought licenses is stored in the table SAM_LicenseCatalog. Triggers are used for dynamic data updating of the table SAM_ContractCatalog.

Sets. Information on sets of software is stored in the table SAM_ContractCatalog, SAM_SoftwareCatalog and SAM_Equals. Triggers are used for dynamic data updating of the table.

Reference books. Reference books include types of licensing, territories, countries, vendors, VAT, suppliers, business customers, files categories, responsible for purchases.

The Pattern of Tables' Interaction

Full list of tables SAM database, as well as their patterns of interaction are shown on figure 1.

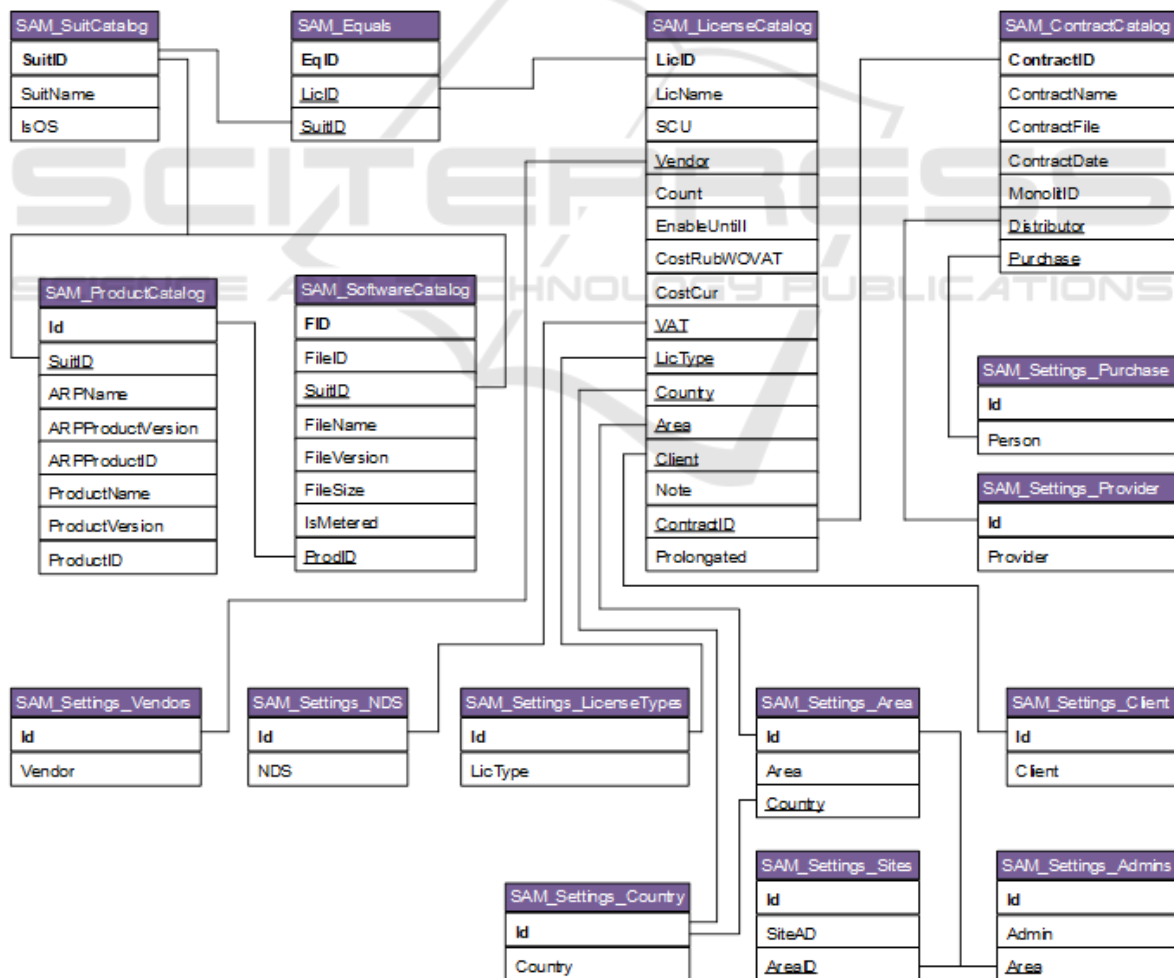


Figure 1: The pattern of SAM tables interaction.

Setting of Tasks

A series of tasks was developed for implementation of notification of the System in SQLServer 2012.

A series of tasks was set in SQLServer 2012. The list of tasks is: License Report, Undescribed products.

4.2 Results of Exploitation

This system was introduced into the infrastructure of a big Russian company in June 2016. During all this time researches of reasonability of this system use were conducted. During the periods of audit data upload was done in the following variants:

1. Data, received with the help of software inventory.
2. Data, received with the help of hardware inventory.
3. Date, received by means of developed system.

The developed system makes to possible to look through the data on installations of the selected software according to the following classification:

1. Legal installations of the software
2. Illegal installations of the software

The category “Legal installations of the software” includes such software installations, where relevant executive files were found, and the record which corresponds to this software was entered into the section of Control panel “Installation and Deinstallation of programs”. Such installations are considered to be legal, as licensed software is installed just in this format.

The category “Illegal installations of the software” includes such software installations, where relevant executive files were found, and the record which corresponds to this software was not entered into the section of Control panel “Installation and Deinstallation of programs”. Such installations are considered to be illegal, as either hacked licensed software or portable version of licensed software is installed in this format. Hacked licensed software is considered to the breach of license agreement. Its use can lead to fine payment. Portable versions of licensed software are free, but their use is not encouraged, as if the auditor uses file inventory as the source of data, portable versions will be considered as full-rate installations of licensed software. It may cause the increase of total number of installations of licensed software. If this quantity exceeds the total number of bought licenses, the company will have to pay fine for the breach of license agreement.

Thus, the category “Illegal installations of the software” gives the opportunity to get information about the quantity of computers, where such installations were found, and it contains their list. It’s a good practice to delete the software under consideration from computers in the selection “Illegal installation of the software” before the audit to avoid getting undesirable results.

For visual reference of reasonability of the use of the developed system statistics concerning installations of licensed software in three above mentioned variants was gathered. The software, which had been audited for all the time of existence of the developed system in the infrastructure of the company, was chosen as the software under consideration. Table 1 shows the results of such selection.

Table 1: Results of selection.

Name of the software	Data of software inventory	Data of hardware inventory	Data of the developed system	
			Legal installations of the software	Illegal installations of the software
TeamViewer	1117	196	196	921
Adobe Photoshop	118	29	29	89
Adobe Acrobat Reader	638	582	582	56
Autodesk AutoCAD	455	176	176	279
ThinkCell	769	700	700	69
ABBY FineReader	453	268	268	185

On the ground of the data from table 1 we can draw a conclusion that the company has computers with illegal installations of all licensed software under consideration. On the basis of the selection of the developed system the list of computers with illegal installations was received, where subsequently portable versions of licensed software were found and deleted. After that one more identical selection was made.

Thus, as the auditors used the data of file inventory (data of file inventory are used by auditors as the source of data on installations of licensed

software in the vast majority of cases), we can make the next table, which shows summary of the quantity of installations, which were found by the auditors in case of absence of the developed system, as well as the quantity of installations, found by the auditors under the conditions of such system existence. The benefit for the company, measured by the quantity of licensed software installations, is shown as a separate column. On the basis of table 2 the reasonability of the developed system use was confirmed visually.

Table 2: The reasonability of the developed system use.

Name of the software	In case of absence of the developed system	In case of existence of the developed system	Benefit
TeamViewer	1117	196	921
Adobe Photoshop	118	29	89
Adobe	638	582	56
Autodesk AutoCAD	455	176	279
Autodesk 3ds Max	769	700	69
ThinkCell	453	268	185
ABBY FineReader	1117	196	921

5 DISCUSSION

As possible ways of evolvement of the developed system the following ones can be indicated: 1. accounting of licenses with complex components. This means licenses, which cover the use of several licensed software at once. 2. Provision of functional capabilities of the system as cloud service. The variant of provision of functional capabilities of the system is not assumed to be as separate software, which should be introduced into the company infrastructure, but as cloud service, the access to which is granted in accordance with concluded license agreement. 3. The calculation of server-based software. This means server-based software, which is licensed not by the quantity of devices,

where it is installed, but by the quantity of processors or cores.

6 CONCLUSIONS

As a result of the undertaken study the deficiencies of available approaches to the construction of the license management system were detected. Methodological recommendations were developed, which make it possible to rectify detected deficiencies in available approaches, which, in its turn, enables to arrange transparent interrelations between the software installed in the company and bought licenses for the use of the software under consideration. It gives the opportunity to control of observance of copyright. This system is particularly urgent for the development of innovative high-tech business as one of the growing point of domestic economy. This system makes it possible to record and store information on concluded contracts for the purchase of licenses for the use of software. This system also gives the opportunity to describe software from the point of view of identification of its installation and binding to the relevant license.

The developed system uses inventory data as the approach to calculation of the quantity of installations of licensed software, that is both types – software and hardware inventory.

Such approach to the arrangement of calculation of the quantity of calculation of installations of licensed software helps to solve determined problems in the process of work with systems of license management:

1. Problems in the approach, based on assignment of licenses for users or device.
2. Problems in the approach, based on the use of one type of inventory.

Problems in the approach based on the use of one inventory type are solved at the expense of use of data of both types of inventory. Due to the possibility of the developed system it is possible to categorize software installation into “legal” and “illegal”. It is also possible to get the list of computers installations on which should be deleted. It will result in decrease of total amount of installations without negative consequences for the work of company users.

In the course of operational period reasonability of the developed system as the tool of license management for the use of software was confirmed. The system also gives the opportunity to get corresponding reports on the used software in the view of observance of terms of license agreement,

which facilitates the receipt of international certificate MC ISO/IEC 19770, confirming the degree of maturity of processes for auditors and partners.

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