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Accounting Server: Automatically Generating Accounting Transactions from Business Modules

Ricardo Salim
Cautus Network Corp. / Software de Venezuela

Carlos Ferran
Governors State University

ABSTRACT

The proliferation of inexpensive yet complex business programs has allowed many small businesses to start operations and even setup online stores. These small businesses are able to generate and manage thousands of transactions. Most of these systems do not have an accounting module and the businesses have to later find an accounting systems and knowledge to generate the necessary accounting reports and ledgers. While many accounting packages also abound, the connection between the business module and the accounting packages are lacking and have become the bottleneck. This paper presents an intermediate application (called Viable Accounting Server) that can easily import data from most business applications and export it to an accounting application.

Keywords: Accounting, Accounting Information Systems, Data conversion.

Introduction

Many small and medium sized companies are able to go into business thanks to the ever increasing number of very powerfully and easily accessible software packages that support and record the business transactions. These systems include but are not limited to online or electronic invoicing and purchasing, online and even mobile banking, web-based payrolls, Customer Relationship Management Systems (CRM), and Supply Chain Management Systems (SCM). Some of these packages are modules that are part of a larger system that also include an accounting module but many are not (Gill, 2011; Salim & Ferran, 2008). Therefore, while these packages solve the day-to-day problems they generally do not constitute a comprehensive solution and leave the accounting of the operations pending.

Accounting applications also abound, however, the connection between the front office solutions and the back office accounting is rarely included. This connection is generally the bottleneck.

These problems of lack of integration between packages and modules have accompanied accounting information systems all along their evolution (Cordoş, Andreica, & Rof, 2010; El Orf, 2012; Salim & Ferran, 2004). In many aspects the problems have grown even more critical. Globalization and the Internet have generated new and more diverse software elements (for

example virtual stores) much faster than their accounting integration solutions appear (Kos, Parks, Psenicka, & Kasuganti, 2002). Of course there have been attempts to use the Internet technologies as part of the solutions (Bizarro & Garcia, 2011; Chandra, 2008) but the solutions have not been good enough so far.

The problems scale to a higher level when we consider accounting complements such as related financial accounts (Ionescu, Ionescu, Mihai, & Cojocaru, 2009), auditing (Bizarro & Garcia, 2011), risk management (Young, 2011), and treatment of uncertainty (Zebda & McEacharn, 2012), just to mention a few examples.

Accounting is generally a very precise science. Most systems and accountants expect that the account determination and corresponding amounts are always selected and calculated very precisely leaving almost no margin to error. On the other hand, social and health sciences are less precise and have always thought of their numbers as a range or estimate and not an exact value. Their calculations have also generally been far more complicated than those of accountants. Today, these sciences are using data mining techniques for their calculations and such approaches are considered very valid. Audit accounting is also using data mining techniques. However, the accounting per se has always been done using precise rules and data mining techniques have had no space there. As data mining techniques have advanced in leaps in the past few years such technology could be the most appropriate to solve the bottle neck between the front and back office (Mraovic, 2008).

Accounting Data Import: The “Somehow” Problem

Accounting is usually a critical but secondary priority in the business systematization process. This is understandable since accounting is by its nature a back-office function; something that is done *after* the basic business operations has taken place (such as invoicing or purchasing). Furthermore, a common belief is that the world has plenty of accounting systems and accountants, so when the time comes, all is needed is to hire a service or purchase a package and somehow (or “somewho” will) extract the accounting data from the business applications and generate the accounting ledgers (Wilmshurst, Frost, & Geoffrey, 2001).

The problem is that the “somehow” and the “somewho” are by far less abundant than the accounting systems and services. There are several reasons for this:

- A business application is usually chosen given its match, usefulness, and applicability to a specific value-added business function in the organization. Its compatibility with the existing accounting software or practices is a secondary and frequently ignored requisite. The accountant (the “somewho”) or some “conversion program” (the “somehow”) are expected to convert the business application data into the “accounting format” afterwards (Hollander, Denna, & Cherrington, 1999).
- The data formats of most accounting systems are very rigid and different from those of the other modules; thus, the required “somehows” or “somewhos” need to fully understand both: the modules format and the accounting format. Given that accounting was not considered in

the first place it is highly improbable that those who are highly familiar with the initial systems are also well versed in accounting.

- Globalization, new technologies, and partial outsourcing usually bring additional incompatibility between the accounting module or practice and business data coming from different countries or cultures. Interpreting or converting this data to known concepts requires the collaboration of more “somewhos” or “somehows” (Crothers, 2012; Jensen, 2003; Kos et al., 2002).
- Finally when the accounting moment comes, there also comes the need for adjustments, updates, closing and opening accounting periods, etc. These tasks require their own “somewhos” and “somehows”, which impose additional difficulties on the former ones.

The consequence is an asymmetry of use between business function modules and business accounting. And the IT solution for this asymmetry is not in the accounting system itself but in the “somehow”, i.e., the process that will allow exporting accounting data from any business application format to an accounting system.

It is reasonable to begin this task by identifying the minimum common information between any administrative module and a basic accounting system. As a matter of fact, in the records of every business transaction, there are a set of common fields, such as the date of the transaction, a number that relates the record with one or more complimentary or counterpart records, a more or less codified concept or chargeable account, a detail of this account, a due date, a comment and of course, an amount. Sometimes a quantity is specified, referring to a number of units of the good or service delivered or received (Bagranoff, Simkin, & Strand, 2005; Macve, 1996). Table 1 is an example of this information.

Table 1

Date	Entry number	Account	Account detail	Comments	Due date	Amount (Db / Cr)	Unit	Units in a package	Qty of packages
9-9-12	00001	Customer	J. Smith	Purchase	9-30-12	55.00			
9-9-12	00001	Goods	Computer	ExampTronix model xxx		-40.00	Unit	1	1
9-9-12	00001	Service	Transport	ExampCourier number 12345		-10.00			
9-9-12	00001	Tax	Sales Tax	10%		-5.00			

A Viable Accounting Server

Most transactional systems have the information of Table 1 in one form or another. This minimum information is sufficient to feed an accounting system (that we will call a Viable Accounting Server or VAS) as long as the data is received under the format and restrictions described in table 2 (below) and the following processes are implemented.

Even if the existing system does not store the data in the format stipulated in Table 2, an interactive system with online validations and functionality similar to that present in the Import

Wizard of Excel is sufficient to convert the data to the specified format. However, some additional offline analysis of the data is always required for detecting entry inconsistencies and produce suggestions to solve them. Furthermore, this validation system is also useful to illustrate the user on how to proceed in the future and even on suggesting ways of improving the record keeping. Nonetheless, the response speed of this process and the clarity of its messages for non-accounting users are obvious key factors of the viability of the whole Accounting Server.

Table 2: Format and restrictions of data for VAS

Field	Date	Entry number	Account	Account detail	Comments	Due date	Amount (Db/Cr)	Unit	Units in a package	Qty of packages
Required	Yes	Yes	Yes	No	No	No	Yes	No	No	No
Default values				Account	"Received on dd-mm-yy"	Date		Unit	1	1
Permitted values for required fields and suggested values for non-required	Date of entry	Reference to complimentary or counter-part records of the same entry	Cash (Bank account) Account receivable / Customer Stock / Fixed Asset Account payable / Supplier Tax / Fiscal Institution Equity Cost of sale Income concept (good or service) Expense	Name or code of Customer, Supplier, Item, Bank account etc.	Descriptions, notes, etc.					

The offline analysis mentioned in the preceding paragraph should be able to group the received records into a list of pattern accounting entries and reject those records that do not feet in any pattern. The pivotal fields for the pattern detection are Entry Number, Account, and Amount. For example, a Sales Invoice Entry will require that a) there are at least two records with the same Entry number, b) the Account of one of the records is a Receivable or Cash account, c) the Account of the other record is an Income concept (referring the good or a service sold) and d) the sum of the values (debit or credits) of the Amount field of all the records is zero.

Table 3 is a comprehensive list of accounting patterns for VAS. Each row refers to a set of two or more records with the same Entry number and whose debits and credits sum zero. Each columns header, except for the first one (Pattern), is one of the possible values of the field Account. The Pattern column contains the names of the accounting patterns for the correspondent rows. A "+", "-", or "<" symbol in an Account column of a pattern row means that at least one record of the set of records referred by the row has the correspondent value in its Account field and the amount of that record is positive, negative or any not 0 value, respectively.

Table 3: VAS accounting patterns

Pattern	Cash (Bank account)	Account receivable / Customer	Stock / Fixed Asset	Account payable / Supplier	Tax / Fiscal Institution	Equity	Cost of sale	Income concept (good or service)	Expense
Cash Sale Invoice	+				-			-	
Cash Expense	-				+				+
Cash Purchase	-		+		+				
Cash transfer	<>								
Receivable Sale Invoice		+			-			-	
Payment received	+	-							
Borrow	+			-					
Payable Expense				-	+				+
Payable Purchase			+	-	+				
Payment made	-			+					
Lend	-	+							
Receivable / Payable transfer		<>		<>					
Investment	+					-			
Production bill			<>						
Stock Delivery			-				+		

Note: Table 3 shows only the “forward” version of each accounting entry. The “reverse” version (such as Debit notes or Credit notes) are similar rows with the “+” symbol changed to “-“ and the “-“ symbol changed to “+“. The “<>” symbol does not change.

A Working Viable Accounting Server

The authors have written a set of algorithms for processing Table 3. These algorithms have been applied to several datasets (of between 5,000 and 70,000 records each) coming from different industries, such as manufacturing, brick and mortar stores, online stores, and professional services. The VAS has generated:

- A set of accounting reports: General Balance, Income and Losses Statement, Trial balance, Detailed trial balance (where the Accounts are broken down by the detail accounts), Account Ledger, Detailed Account Ledger and General Journal.
- A report of rejected records (those that do not fit into any of the patterns and that were not included in the accounting reports). This report shows the detected inconsistencies and gives suggestions to solve them. The number of rejected records has been below 5% of the total records processed.

Findings have shown that the algorithms are not restrictive to new patterns, though they are very restrictive to new Accounts. In fact, as the rejected records are analyzed the authors (and users) have been able to generate new patterns. An eventual VAS administrator (human or automated) only needs to name any occurrence of a new set of records (records with the same Entry) so that each one of them refers to one of the accounts of the table and whose debits and credits sum zero. The algorithms and the reports work well with any new pattern.

The addition of new accounts has shown to be far more complicated. Adding new accounts is not prohibited but as new accounts are added not only new algorithms need to be added but many of the existing ones also need to be adjusted. Nonetheless, a comprehensive set of accounts can be developed at the start and additions can be made though they are costly. Therefore the business profile for VAS is not constrained by the patterns (rows) as far as they use only the accounts (columns) of Table 3. The account restriction excludes businesses that need a category of accounts that do not fit in any of the current account.

Conclusions

Many small and medium sized businesses are currently operating thanks to the large number of inexpensive applications that handle their front office. These businesses also leverage the many accounting packages available in the market. However, their operations are frequently limited by the bottleneck present between the two systems. The usage of a comprehensive package like SAP, Oracle Financials, Baam, Peoplesoft, and a few other that include both front and back office functionality might be a perfect solution; however, these are often outside the financial reach of most SMEs. Another solution is the development of a comprehensive system using innovative models like IAC (Ferran & Salim, 2004) but again most of these business lack the necessary resources (financial, technical, and/or human) to undertake such endeavors. Thus the current solution lies in a three-tier system with a middle-tier consisting of an accounting server as described above that converts the basic information present in most business applications into accounting transactions using a somewhat simple knowledge base that can grow as business transactions become more complex.

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