

3-15-2023

Teaching Tip: A Teaching Module Illustrating ERP Item Value Automation

Anil Singh

University of Texas Rio Grande Valley, anil.singh@utrgv.edu

Vikram S. Bhadauria

Texas A&M University-Texarkana, vbhadauria@tamut.edu

George Mangalaraj

Western Illinois University, G-Mangalaraj@wiu.edu

Follow this and additional works at: <https://aisel.aisnet.org/jise>

Recommended Citation

Singh, Anil; Bhadauria, Vikram S.; and Mangalaraj, George (2023) "Teaching Tip: A Teaching Module Illustrating ERP Item Value Automation," *Journal of Information Systems Education*: Vol. 34 : Iss. 1 , 16-31. Available at: <https://aisel.aisnet.org/jise/vol34/iss1/2>

This material is brought to you by the AIS Affiliated Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in Journal of Information Systems Education by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Teaching Tip
**A Teaching Module Illustrating ERP Item Value
Automation**

Anil Singh, Vikram S. Bhadauria, and George
Mangalaraj

Recommended Citation: Singh, A., Bhadauria, V. S., & Mangalaraj, G. (2023). Teaching Tip: A Teaching Module Illustrating ERP Item Value Automation. *Journal of Information Systems Education*, 34(1), 16-31.

Article Link: <https://jise.org/Volume34/n1/JISE2023v34n1pp16-31.html>

Received: December 14, 2021
Revised: March 18, 2022
Accepted: June 20, 2022
Published: March 15, 2023

Find archived papers, submission instructions, terms of use, and much more at the JISE website:
<https://jise.org>

ISSN: 2574-3872 (Online) 1055-3096 (Print)

Teaching Tip

A Teaching Module Illustrating ERP Item Value Automation

Anil Singh

The Robert C. Vackar College of Business and Entrepreneurship
University of Texas Rio Grande Valley
Brownsville, TX 78520, USA
anil.singh@utrgv.edu

Vikram S. Bhaduria

College of Business, Engineering, and Technology
Texas A&M University-Texarkana
Texarkana, TX 75503, USA
vbhaduria@tamut.edu

George Mangalaraj

School of Computer Sciences
Western Illinois University
Macomb, IL 61455, USA
g-mangalaraj@wiu.edu

ABSTRACT

Large parts of the enterprise resource planning (ERP) processes are automated. One example is the item values in the sales order process. To execute a sales order, the ERP system applies a specific “find” strategy on a wide variety of data sources such as customer master, material master, and customer price-specific data tables, and extracts information such as customer class, discounts, and dates for computations of line items, namely, prices, discounts, and taxes. While completing their ERP assignments on the sales order process, students often see only the final sales order amount and ignore—and thereby fail to appreciate and understand—the intricacies of the automated method that executes “behind the scenes” to achieve the sales order numbers. This leaves a gap in students’ learning process, as they treat the ERP automation mechanism as a black box and do not appreciate the finer details of the business process that come into play. To illustrate the general method involved in a business automation process, we have developed a teaching technique where students—without the use of ERP software—complete a sales order by manually searching for values in a sequence based on the business processing logic. This task helps students understand and appreciate the internal processes of business automation in ERP systems.

Keywords: Enterprise resource planning (ERP), Pedagogy, Enterprise systems education, Teaching tip

1. INTRODUCTION

Business students intending to work with enterprise systems require a deep understanding of the business processes involved before they join the workforce. Enterprise resource planning (ERP) addresses modern businesses’ complexities, such as price discrimination and dynamic pricing, through algorithms and automation. Most processes in ERP’s systems are automated and occur behind the scenes without the user’s awareness. As a case in point, posting of accounting journal entries is fully automated for many business processes, e.g., ordering, invoicing, shipping, purchasing, and inventory movement.

When processing the sales order, the system running in the background considers various factors, such as customer, material, discounts, and dates to achieve the final sales order amount. For a better comprehension of the business process, students need to understand how the system obtains those values in the sales order. This helps students acquire problem-solving skills, a key asset for their future professional careers. Hence, the learning objective of this teaching module is to improve understanding of the development/mechanics side of the ERP systems.

While traditional computer-based ERP simulations—as a teaching method—can be used, these do not expose the inner

workings of the ERP system. In an ERP process, a significant portion of the activity happens in the background, such as populating the values in sales orders and accounting entries. Generally, students with little experience in ERP find such computer-based ERP-related assignments tedious (Shen et al., 2015), as they are required to complete a list of steps mechanically. Furthermore, the learning process is lost when items in ERP processes—such as prices, discounts, and taxes—are automatically filled. Students are deprived of understanding the basis of how to determine these items, which leads to suboptimal learning. Therefore, to maximize learning, an experiential learning approach is recommended (Fathelrahman & Kabbar, 2018). To this end, and in line with calls for more research in ERP teaching (Fedorowicz et al., 2004), we have developed a hands-on paper-based simulation assignment where students manually search for values based on established criteria to obtain sales order item values. Such business simulation in ERP education results in higher-order learning pertaining to analysis, synthesis, and evaluation (Monk & Lycett, 2011).

2. LITERATURE REVIEW

2.1 ERP Education

As ERPs become more widespread, educators have tried various ways to incorporate them into the business curriculum (Hepner & Dickson, 2013) and to emphasize the importance of learning about ERP systems (Alshare & Lane, 2011). For instance, Cronan et al. (2011) used simulation to develop ERP knowledge and skills, Hustad and Olsen (2014) employed ERP failures to gain insights into ERP implementation, while others emphasized hands-on activities and exercises (Pridmore et al., 2014; Zadeh et al., 2020). Some educators have focused on specific aspects of ERP, such as internal controls (Barkhi & Kozlowski, 2017), human resources (Hawking et al., 2002), or ERP-related programming (Boyle, 2007).

2.2 Challenges in Teaching ERP Concepts

ERP courses provide ideal opportunities to build upon and improve students' understanding of business processes (Fathelrahman & Kabbar, 2018). Instructors pursue different methods and techniques to help students understand ERP processes (Ayyagari, 2011). However, teaching ERP has its own set of challenges, which are discussed below.

2.2.1 Automation. While automation in ERP modules provides efficiency, it also poses challenges in teaching the inner mechanisms to students. ERP systems automate business process logic and provide a user interface to carry out various business transactions. However, these easy-to-use capabilities of ERP systems hide the complexities involved in the processing and application of appropriate business rules. Due to the inherent process automation in ERPs, students do not get to see the actions occurring in the background. When completing standard ERP assignments, students go through the steps mechanically, with little understanding of the underlying logic. Fedorowicz et al. (2004, p. 241) revealed that when doing ERP exercises, students found it difficult to “see the forest for the trees.” Most activity, such as populating values in sales orders and accounting entries, happens in the background. Students perceive it as “abstract and dry” (Shen et al., 2015, p. 265), as they must complete a list of steps mechanically. Therefore, the learning objectives get compromised, as students

focus on merely completing the stages that typically belong to lower-level domains in Bloom's cognitive taxonomy (Bloom et al., 1956). Complete mastery of complex business process education involving ERP should be at the higher end of the taxonomy (Monk & Lycett, 2011).

2.2.2 Complexities. To address the complex needs of modern businesses, ERPs cover all aspects of business, and thus, they have significant breadth, depth, and intricacy. This, however, leads to first-time users being overwhelmed by the enormity of ERPs (Seethamraju, 2011). Mastering even one aspect of ERP demands significant effort from novice learners. Therefore, the learning process must be gradual and proceed in an incremental and piecemeal fashion to be successful.

2.2.3 Accessibility. Not all universities have comprehensive access to ERP systems, as gaining such access requires significant financial and technological commitment regarding costs and instructor training (Hepner & Dickson, 2013). Some universities provide one or two introductory courses in ERP where students learn ERP basics. The constraints of the teaching environment make ERP coverage “a mile wide and an inch deep.” However, mastering ERP requires deeper learning.

3. TEACHING MODULE

In this teaching module, students work on a common business process, namely, the sales order, and they mimic the functioning of the ERP system in calculating the line item values of an order. According to business rules, they extract prices based on quantity, discounts, and taxes from the table to populate the sales orders and obtain the sales order total. The teaching module introduces concepts ranging from introductory sales order pricing to more complex pricing with various discounts and taxes in four increasingly complicated sections. Students can better understand the business rules/logic processing in ERP systems during this teaching model. This module does not require the use of ERP software. The appendices contain the student handout and the solutions.

3.1 Module Details

Students complete ten sales orders manually by referring to various tables. In the first section (sales orders 1, 2, and 3), they obtain the values using a search strategy of getting the first price they see when they go from the most specific table to the most general one. In the second section (sales orders 4, 5, and 6), the value-obtaining process has the additional complexity of the quantity-based price from the tables but involves the same search strategy. In the third section (sales orders 7, 8, and 9), the process becomes even more complicated due to the discount factor, and students use a search strategy of getting the best (most favorable) discount they can find when they go from the most specific to the most general table. In the fourth section (sales order 10), they compute taxes based on the tax status (exempt or not) of the customer, the tax status of the material, and the tax rate of the customer's location.

3.2 Intended Audience and Strategies for Module Usage

This module does not require prior knowledge of ERP and is designed for any student with a basic understanding of pricing. While this module can be used independently, we recommend doing it prior to the computer-based ERP sales order process.

This teaching module can also be used in introductory information systems and decision science courses. The module can be administered as homework, demonstrated in class, or a combination of these. Furthermore, the instructor can demonstrate the completion of some sales orders from the student handout in class as a primer (guided method) and deploy the remaining as an assignment. It can be done as traditional homework individually or in groups. During a face-to-face in-class assignment, the instructor can provide physical copies of the handout to the class, and students can write the answers into the tables in the handout. A digital copy can be provided in spreadsheets in the online course format, and students fill in the answers and return them to the instructor. The take-home assignment format allows for time to reflect and digest the content. Alternatively, if there is a paucity of time, a guided approach can be taken in which students follow the instructor as they complete selected sales orders during class. As such, the instructor can provide a deeper understanding of the process at every stage. The appendix contains the solution for the teaching module. For reusability, the instructor can deploy selected sales orders every semester.

4. DEBRIEFING

After the assignment, the instructor can apprise students of the following complexities in the pricing process:

- Date constraints—all reference tables in the module can be further constrained by dates. There can also be a sequence, i.e., the system can look at specific dates for the prices, and if not found, a catch-all default dateless value is then sought.
- Concepts of specific overrides and defaults—going from the most specific to the most general (catch-all default value), e.g., shipping default preferences that can be overridden.
- History tables—when new prices are assigned, the system puts the old prices in history tables.
- Freight costs—can also be automated based on distance, volume, and weight.
- Rebates/coupons—can add new complexities to the order.

5. METHOD EFFICACY

After the Institutional Review Board’s approval, this module was tested on 23 undergraduate students taking their introductory ERP course at two universities. The following questions adapted from Davis and Comeau (2004) and Zadeh et al. (2020) were used as survey items. Some items were negatively worded. Table 1 below presents the results of the student feedback.

Feedback from students revealed the degree of achievement of the learning objectives. As shown in Table 1, most students had little or no experience in ERP. Generally, students completed the module as per the handout details without help or any explanation. Most agreed that the exercise was valuable and reasonable and that they gained new knowledge. The average completion time was a little over an hour. The debriefing session added value to the learning process. Furthermore, informal feedback revealed that students understood the underlying logic, making it easier to complete the modules on the real system. Feedback from instructors

revealed that occurring mistakes were primarily due to students’ missing the values in the tables. Some students conveyed that doing all ten sales orders was tedious. To address this, instructors can demonstrate the completion of some orders in class and deploy the others as assignments.

Variables	Mean	SD
<i>My knowledge of pricing before taking this course was: 1: Little to 5: High</i>	2.67	0.94
<i>My hands-on experience with ERP software before taking this course was: 1: Little to 5: High</i>	1.77	1.47
<i>This exercise improved my understanding of the development/mechanics side of the ERP system without going too much into details: 1: Strongly disagree to 5: Strongly agree</i>	3.77	0.78
<i>The exercises were reasonable and useful: 1: Strongly disagree to 5: Strongly agree</i>	4.44	0.68
<i>The steps described in the handout were not working: 1: Strongly disagree to 5: Strongly agree</i>	2.11	0.73
<i>I gained no new knowledge from these exercises: 1: Strongly disagree to 5: Strongly agree</i>	1.55	1.06
<i>The module gave me a better understanding of the pricing process in ERPs: 1: Strongly disagree to 5: Strongly agree</i>	4.33	0.66
<i>The student handout was easy to follow: 1: Strongly disagree to 5: Strongly agree</i>	3.66	0.81
<i>The debriefing added value to my understanding of pricing in ERPs: 1: Strongly disagree to 5: Strongly agree</i>	4.11	0.73
<i>How much time did you take to complete this assignment (in minutes)</i>	67.73	7.74
<i>Assessment results (10 points – 1 point per completed order)</i>	8.13	0.61

Table 1. Student Feedback on the Teaching Module

6. CONCLUSION

Without delving too much into the ERP jargon, we provide a teaching module for students to understand the intricacies of obtaining pricing for sales orders in ERP systems, which enables a deeper connection to and understanding of the business rules involved in pricing products in a sales order. While this module does not cover—to any degree—the entirety of the sales order process in ERPs, it provides a good understanding of how pricing for sales order items is achieved.

7. REFERENCES

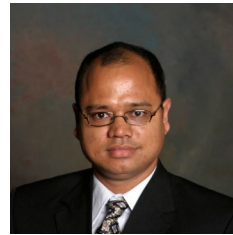
Alshare, K. A., & Lane, P. L. (2011). Predicting Student-Perceived Learning Outcomes and Satisfaction in ERP Courses: An Empirical Investigation. *Communications of the Association for Information Systems*, 28(34), 571-584.

Ayyagari, R. (2011). Hands-on ERP Learning: Using OpenERP®, an Alternative to SAP®. *Journal of Information Systems Education*, 22(2), 123-134.

- Barkhi, R., & Kozlowski, S. (2017). ERP in the Classroom: Three SAP Exercises Focused on Internal Controls. *Journal of Emerging Technologies in Accounting*, 14(1), 77-83.
- Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook I: Cognitive Domain*. Longmans.
- Boyle, T. A. (2007). Computers-for-EDU: An Advanced Business Application Programming (ABAP) Teaching Case. *Journal of Information Systems Education*, 18(3), 283-295.
- Cronan, T. P., Douglas, D. E., Alnuaimi, O., & Schmidt, P. J. (2011). Decision Making in an Integrated Business Process Context: Learning Using an ERP Simulation Game. *Decision Sciences Journal of Innovative Education*, 9(2), 227-234.
- Davis, C. H., & Comeau, J. (2004). Enterprise Integration in Business Education: Design and Outcomes of a Capstone ERP-Based Undergraduate e-Business Management Course. *Journal of Information Systems Education*, 15(3), 287-300.
- Fathelrahman, A., & Kabbar, E. (2018). Conceptualization of Enterprise Systems Education Using an Experiential Learning Framework. *Journal of Education for Business*, 93(2), 46-50.
- Fedorowicz, J., Gelinis Jr., U. J., Usoff, C., & Hachey, G. (2004). Teaching Tip: Twelve Tips for Successfully Integrating Enterprise Systems Across the Curriculum. *Journal of Information Systems Education*, 15(3), 235-244.
- Hawking, P., Foster, S., & Bassett, P. (2002). An Applied Approach to Teaching HR Concepts Using an ERP system. *Proceedings of Informing Science and IT Education Conference, Cork, Ireland* (pp. 699-704).
- Hepner, M., & Dickson, W. (2013). The Value of ERP Curriculum Integration: Perspectives from the Research. *Journal of Information Systems Education*, 24(4), 309-326.
- Hustad, E., & Olsen, D. H. (2014). ERP Implementation in an SME: A Failure Case. In J. Devos, H. Landeghem, & D. Deschoolmeester (Eds.), *Information Systems for Small and Medium-sized Enterprises* (pp. 213-228). Springer.
- Monk, E., & Lycett, M. (2011). Using a Computer Business Simulation to Measure Effectiveness of Enterprise Resource Planning Education on Business Process Comprehension. *Proceedings of the 11th International Conference on Information Systems*. Shanghai, China.
- Pridmore, J., Deng, J., Turner, D., & Prince, B. (2014). Enhancing Student Learning of ERP and Business Process Knowledge through Hands-on ERP Exercises in an Introductory Management of Information Systems Course. *Proceedings of SAIS 2014*, 31.
- Seethamraju, R. (2011). Enhancing Student Learning of Enterprise Integration and Business Process Orientation through an ERP Business Simulation Game. *Journal of Information Systems Education*, 22(1), 19-29.
- Shen, Y., Nicholson, J., & Nicholson, D. (2015). Using a Group Role-Play Exercise to Engage Students in Learning Business Processes and ERP. *Journal of Information Systems Education*, 24(4), 265-280.
- Zadeh, A. H., Zolbanin, H.M., Sengupta, A., & Schultz, T. (2020). Enhancing ERP Learning Outcomes through Microsoft Dynamics. *Journal of Information Systems Education*, 31(2), 83-95.

AUTHOR BIOGRAPHIES

Anil Singh holds the following degrees: Doctor of Philosophy



(Ph.D.) from The University of Texas at Arlington; Bachelor of Science from Goa University; Master of Management Studies from Goa University, India; Master of Information Systems from The University of Texas at Arlington; and Master of Science (M.Sc.) in accounting from Texas A&M

Commerce. He has over five years of industry experience and is currently pursuing research and teaching at the University of Texas Rio Grande Valley. He is engaged in research on ERP, trust, information technology in supply chains, and new technologies. He has published in *Communications of the ACM*, *Journal of Information Systems Education*, *Journal of Accounting Education*, and *IEEE Transactions on Professional Communication*.

Vikram S. Bhadauria is an associate professor of management



information systems at Texas A&M University in Texarkana, TX. He received his Ph.D. in information systems from the University of Texas at Arlington. His current research includes cyber security, data analytics, sustainability, Internet of Things, and self-driving technology adoption. His research

publications have appeared in *Journal of the Association for Information Systems*, *Journal of Database Management*, *Computers in Human Behavior*, *Information and Computer Security*, *Industrial Management & Data Systems*, *International Journal of Productivity and Quality Management*, *Management Research Review*, *Supply Chain Management: An International Journal*, etc. He has also won many research grants and presented papers at several international conferences.

George Mangalaraj is a professor of information systems at



the College of Business and Technology, Western Illinois University in Macomb, IL. He received his M.Sc. and Ph.D. degrees in information systems from The University of Texas at Arlington. His research interests are in the areas of IT governance, IT strategies, and online environment issues. He has

published in *Communications of the ACM*, *European Journal of Information Systems*, *Journal of the Association for Information Systems*, *Journal of Computer Information Systems*, *MIS Quarterly*, *Journal of Information Systems Education*, *Journal of Accounting Education*, and various conference proceedings.

APPENDICES

Appendix A. Student Handout

Your company is in the business of manufacturing widgets. Some of these devices are for medical use. Your company caters to B2B customers in the USA who buy small amounts or in bulk. Some of these customers are government entities.

The ERP system is down, and you have to process a sales order urgently. Hence, your manager has asked you to manually create sales orders until the ERP system returns online. You have access to the customer information, price lists, and various discount information in tabular format (Tables 1–12). You are also aware of the policies and search strategies that are inherent in the system. In this paper, you will mimic the pricing that is calculated by the system. Complete the 10 sales orders by looking for the item price, discounts, and taxes that are available in Tables 1–12.

SCENARIO 1: SALES ORDERS WITH PRICE ONLY

The company records prices for each material in the material master (Table 4). However, it also rewards loyal customers and sorts them into various classes with differing prices (Table 2). Moreover, going beyond the customer class–based prices, the company offers special prices to specific customers (Table 1). These specific prices are negotiated beforehand based on binding contracts. Figure 1 presents the flowchart for calculating pricing for sales orders 1, 2, and 3. Whenever a sales order is created, first you need to look at any specific prices for the material for specific customers (Table 1: Customer–Material–Price List). If a record is found, that is the price charged to the customer for the material. If not found, you need to look for the material price for the class the customer belongs to (Table 2: Material–Class–Price). (Note: Obtain customer class from Table 3: Customer–Master.) If a record is found, that is the price charged to the customer for the material. If not found, you need to look for the catch-all price in Table 4: Material–Master–Price. For sales orders 1, 2, and 3, use Tables 1, 2, 3, and 4 to get the price and fill the shaded cells.

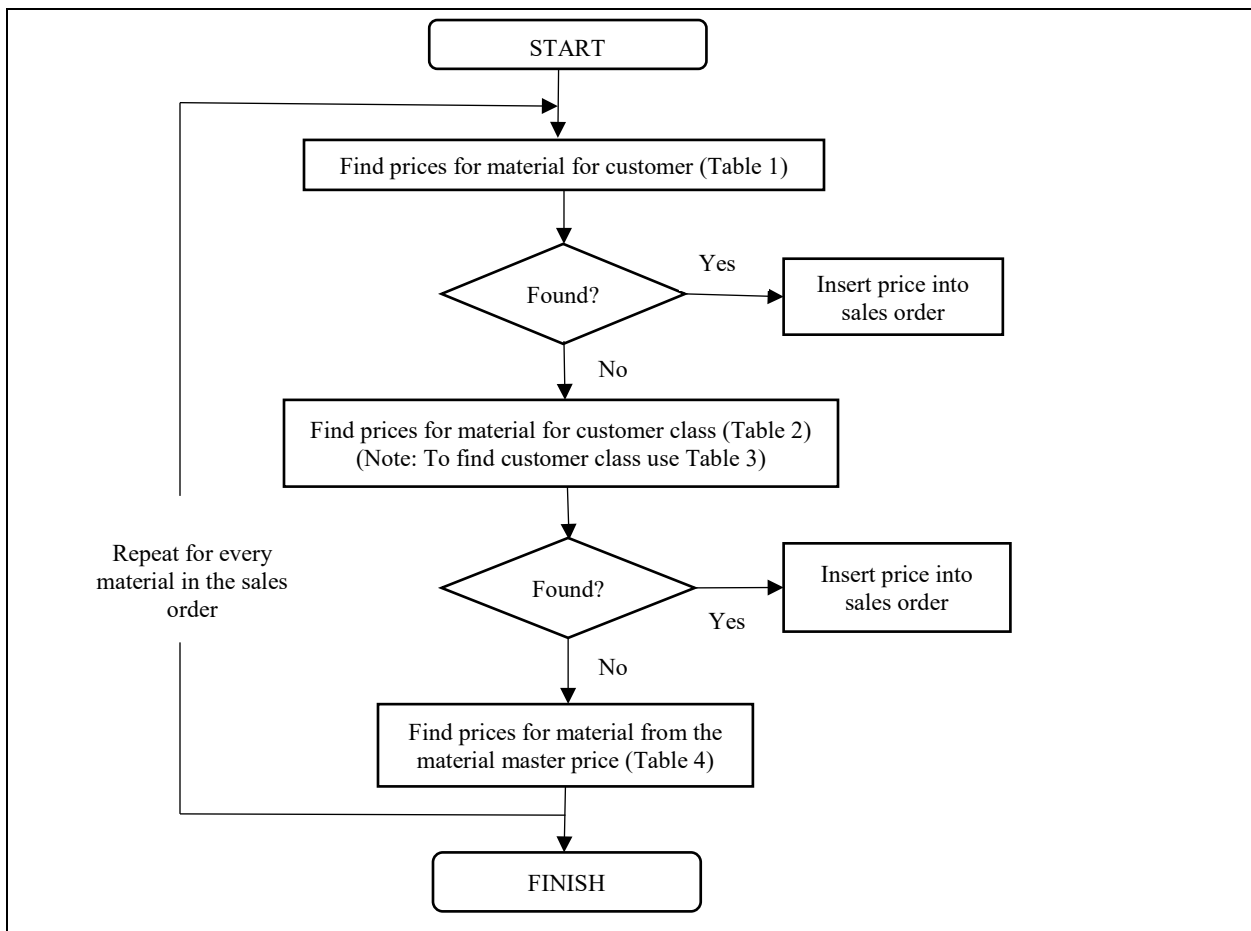


Figure 1. Flowchart—Determining Price

SALES ORDER 1

Customer #: 25001		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID107	100		
WID104	5		
WID101	80		
Total			

SALES ORDER 2

Customer #: 25005		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID102	9		
WID105	15		
WID106	40		
Total			

SALES ORDER 3

Customer #: 25007		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID103	1		
WID104	45		
WID107	20		
Total			

SCENARIO 2: SALES ORDERS WITH QUANTITY-DEPENDENT PRICE

The company also provides lower rates to customers who order more to promote bulk buying. As such, the prices in the previous steps now have a quantity factor added. They decrease along with an increase in the quantity ordered. Therefore, much more detailed tables (due to the addition of the quantity factor) have to be used (Tables 5, 6, and 7). Whenever a sales order is created, you must first look at any specific prices for the material for the specific customer for the specific quantity (Table 5: Customer–Material–Quantity). The values in the tables are ordered from the lowest to the highest quantity. Therefore, if the searched quantity is not listed, then the next-highest quantity is used. For example, in Table 5, for customer # 25006 buying the WID101 material, there are three rows with quantities listed in increasing order. In this case, if you are looking for any quantity between 1 and 29, your answer would be \$69; for quantities 30–49, it would be \$61; and for any quantity 50 and above, it would be \$54.

If a record is found, that is the price charged to the customer for the material. If not found, you need to look for the material price for the class the customer belongs to (Table 6: Material–Class–Quantity). (Note: Obtain customer class from Table 3: Customer–Master.) If a record is found, that is the price charged to the customer for the material. If not found, you need to look for the catch-all price in Table 7: Material–Quantity. Figure 2 presents the flowchart for calculating pricing for sales orders 4, 5, and 6. For these sales orders, use Tables 5, 6, and 7 to get the price and fill the shaded cells.

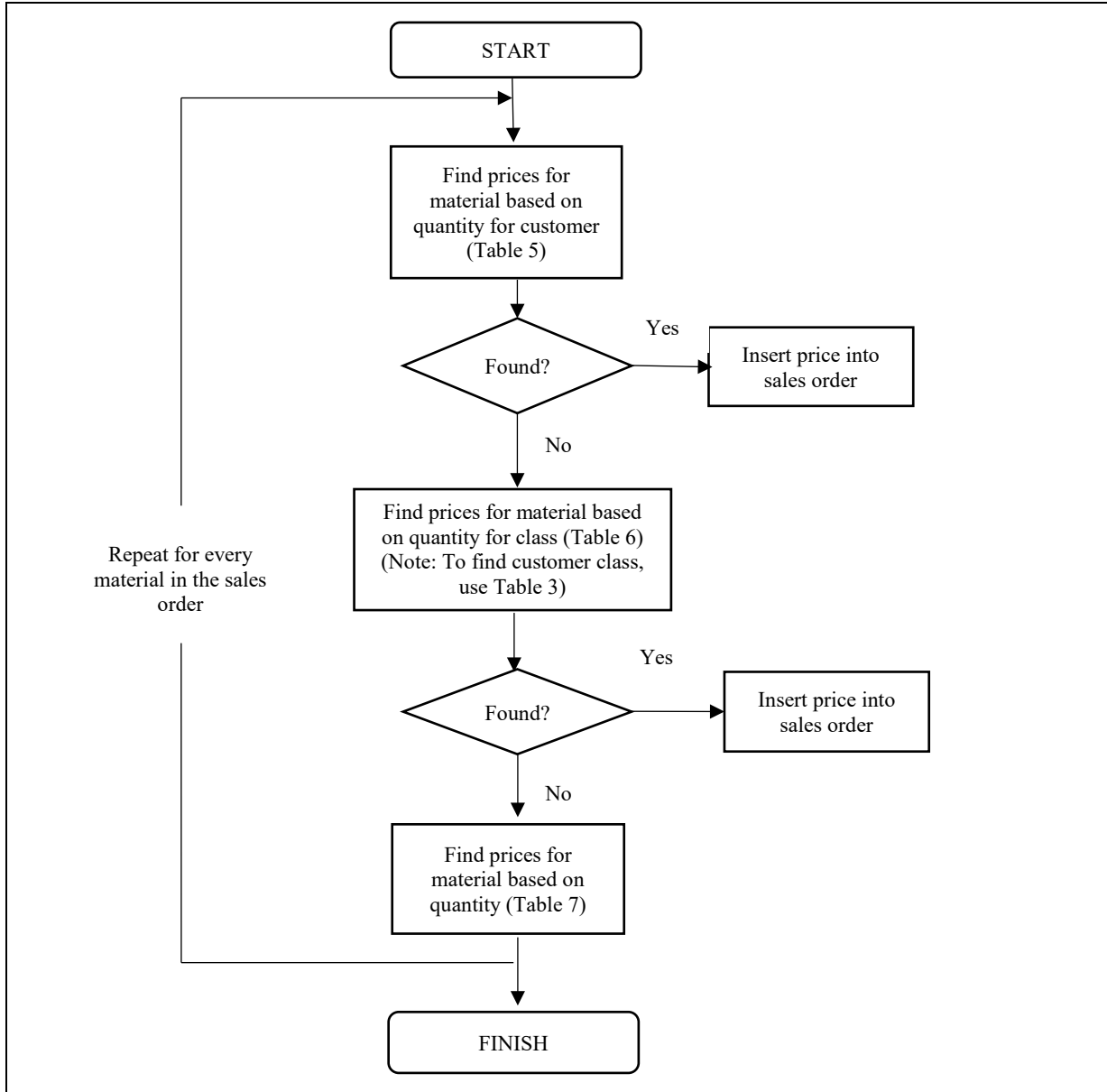


Figure 2. Flowchart—Determining Quantity-Based Price

SALES ORDER 4

Customer #: 25006		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID101	100		
WID103	5		
WID107	80		
Total			

SALES ORDER 5

Customer #: 25006		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID101	9		
WID105	15		
WID106	40		
Total			

SALES ORDER 6

Customer #: 25007		Customer Class:	
Material #	Quantity	Price	Quantity * Price
WID103	1		
WID104	45		
WID107	20		
Total			

SCENARIO 3: SALES ORDERS WITH QUANTITY-DEPENDENT PRICE WITH CASH DISCOUNT

Beyond bulk prices, the company also provides discounts on certain materials to promote sales. Discounts are also given to a particular class of customers for a specific material. Furthermore, discounts are offered to specific customers for a specific material. Occasionally, the company also provides a holiday discount of 15% on all materials during the last week of the year. (Note: Consider this is the last week of the year.) Figure 3 presents the flowchart for calculating the discounts for sales orders 7, 8, and 9. The company has a sales policy of providing the best discount available instead of adding them up. In other words, the company does not want the customer to get all the discounts, such as a specific discount for the customer, material, and holiday. Therefore, the company has set it up to be an exclusive condition, which means that only one of the discounts (highest/most favorable) will be selected.

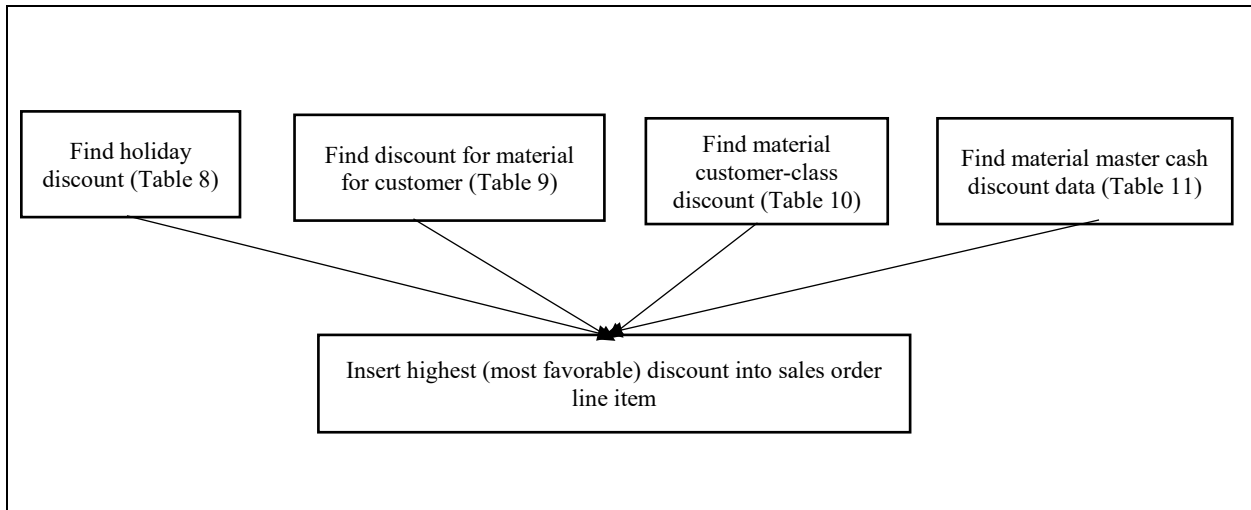


Figure 3. Flowchart—Determining Most Favorable Discount

For example, if the customer-material discount is 25% and the holiday discount is 15%, then the final discount will be 25%. The price-seeking mechanism will be the same as sales orders 4, 5, and 6 (Scenario 2). The new aspect is the discount column.

SALES ORDER 7

Customer #: 25001		Customer Class:		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID101	100			
WID104	5			
WID107	80			
Total				

SALES ORDER 8

Customer #: 25005		Customer Class:		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID102	9			
WID105	15			
WID106	40			
Total				

SALES ORDER 9

Customer #: 25007		Customer Class:		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID103	4			
WID104	45			
WID106	20			
Total				

SCENARIO 4: SALES ORDER WITH QUANTITY-DEPENDENT PRICE WITH CASH DISCOUNT AND SALES TAXES

Now you must include taxes in the sales order. Certain materials—like those for medical purposes—are tax exempt. This is listed in Table 11: Material–Master, where 0 means *tax-exempt* and 1 means *the material is taxed*. Some customers are government entities and, therefore, are sales tax exempt (0% tax). Tax status for customers is listed in Table 3: Customer–Master. If the customer is tax exempt, then all the items in the tax columns in the sales order should show a tax of 0. For all materials that are tax exempt, the tax should show 0. For non-exempt customers with non-exempt material, go to the customer master and get the tax jurisdiction. The tax jurisdiction code—for taxation purposes—defines the state, county, and city of the customer. ERPs normally do not record tax rates for each state, county, and city. Separate third-party entities like Vertex store tax rates and provide sales tax data for integration with ERPs. The ERP system sends the tax jurisdiction code of the customer and receives the tax rate from Vertex (Figure 4). Assume that the input to the third party and the response are in Table 12. Using the tax jurisdiction code, get the tax rate from Table 12: Tax Input and Output.

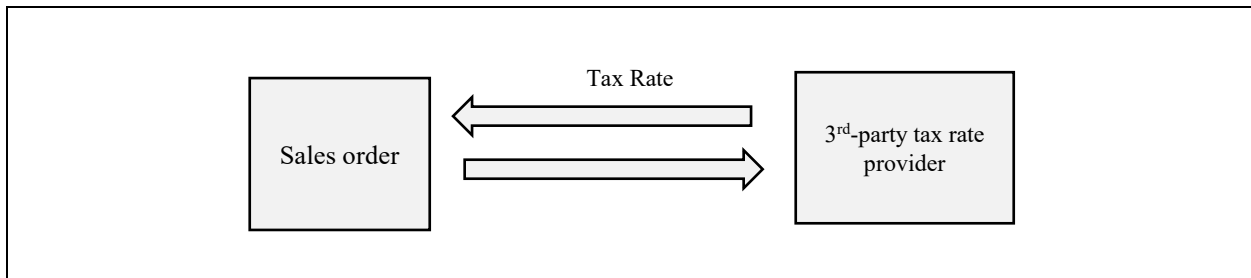


Figure 4. Tax Jurisdiction Code Input—Tax Rate Return

The subtotals (columns) to be used for sales order 10 are price (quantity based like scenario 2), followed by discount on price (scenario 3) and tax on the net price to obtain the final sales order amount. Sales order 10 uses Tables 5, 6, 7, 8, 9,10, 11, and 12. Figure 5 presents the flowchart for calculating the sales tax rate column for sales order 10.

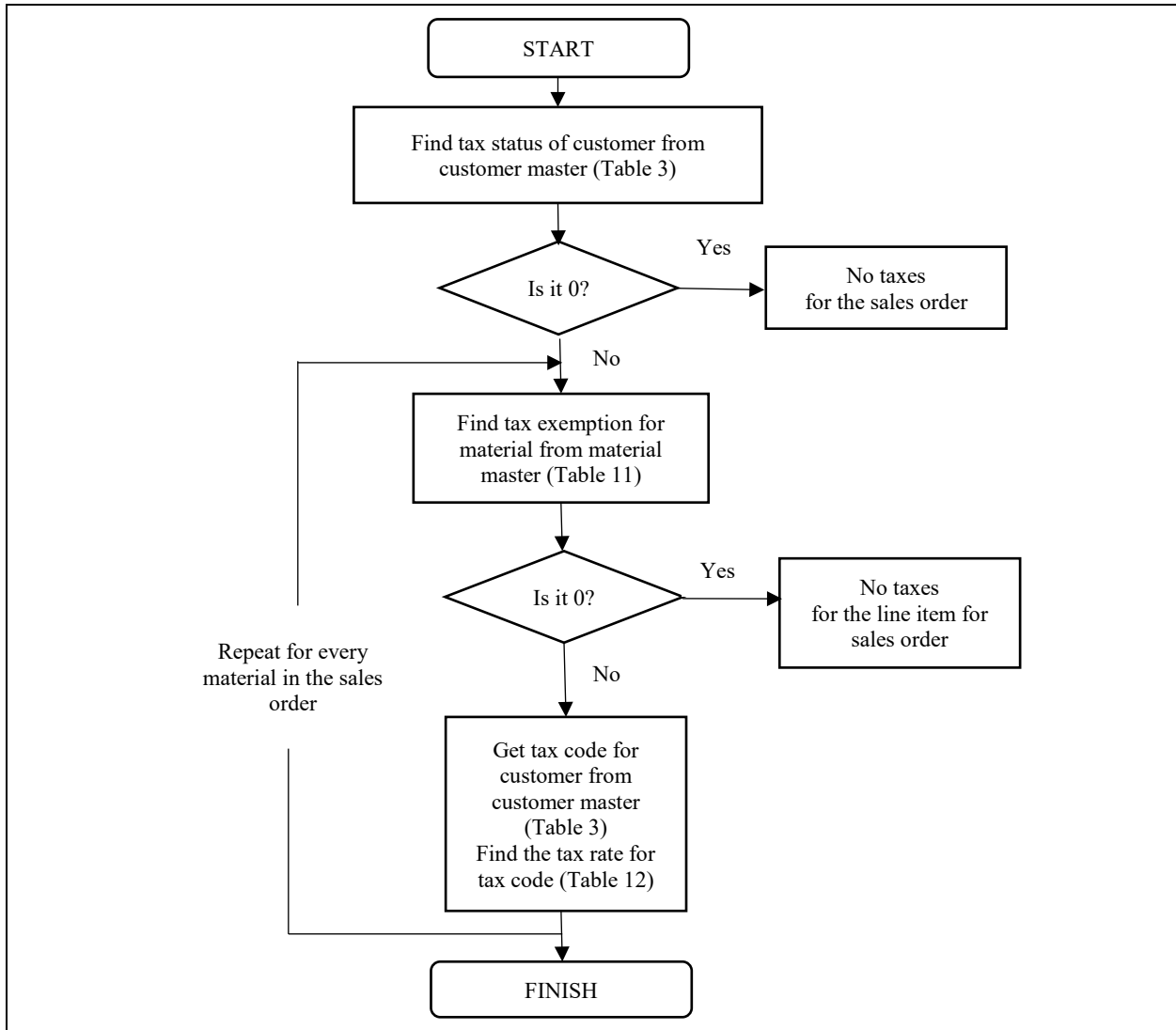


Figure 5. Flowchart—Determining Taxes

SALES ORDER – 10

Customer #: 25005		Customer Class:				
Material #	Quantity	Price	Discount	Discounted Price * Quantity	Sales Tax Rate	Line Total
WID101	100					
WID104	5					
WID107	500					
Order Total						

REFERENCE TABLES

TABLE 1: CUSTOMER–MATERIAL–PRICE LIST

Customer #	Material	Price
25001	WID101	\$75
25002	WID102	\$71
25002	WID103	\$72
25002	WID107	\$69
25005	WID102	\$73
25005	WID103	\$72
25005	WID106	\$74
25007	WID102	\$70
25007	WID104	\$76
25007	WID105	\$75
25007	WID107	\$79

TABLE 2: MATERIAL–CUSTOMER CLASS–PRICE LIST

Material #	Class	Price
WID101	A	\$80
WID101	B	\$85
WID101	C	\$90
WID102	A	\$80
WID102	B	\$85
WID102	C	\$93
WID103	A	\$82
WID103	B	\$86
WID103	C	\$87
WID104	A	\$80
WID104	B	\$85
WID104	C	\$95

TABLE 3: CUSTOMER–MASTER EXCERPT

Customer #	Name	State	Zip	Tax Class	Tax Code	Customer Class
25001	Apple Labs	AL	36013	1	AL0000000	B
25002	L.A. Labs	CA	95814	1	CA0000000	C
25003	RTB Stores	CA	95814	0	CA0000000	C
25004	ABC Labs	AR	72002	0	AR0000000	A
25005	Micro Labs	AR	72209	1	AR0000000	A
25006	US Labs	TX	78521	0	TX0000000	A
25007	Texas Labs	TX	76019	0	TX0000000	B

TABLE 4: MATERIAL–MASTER–PRICE LIST EXCERPT

Material #	Description	Price
WID101	Widget Blue	\$100
WID102	Widget Green	\$100
WID103	Widget Yellow	\$100
WID104	Widget White	\$100
WID105	Widget Black	\$100
WID106	Widget Blue	\$100
WID107	Widget Orange	\$100

TABLE 5: CUSTOMER–MATERIAL–QUANTITY–PRICE LIST

Customer #	Material	Unit	Price
25006	WID101	1	\$69
25006	WID101	30	\$61
25006	WID101	50	\$54
25006	WID102	1	\$70
25006	WID102	15	\$65
25006	WID102	50	\$60
25006	WID104	1	\$70
25006	WID107	1	\$70
25006	WID107	20	\$65
25007	WID102	1	\$70
25007	WID103	1	\$65
25007	WID106	1	\$70
25007	WID106	40	\$65
25007	WID106	60	\$60

TABLE 6: MATERIAL–CUSTOMER CLASS–QUANTITY–PRICE LIST

Material #	Class	Quantity	Price
WID101	A	1	\$80
WID101	B	1	\$80
WID101	C	1	\$80
WID101	C	10	\$74
WID101	C	30	\$65
WID102	A	1	\$80
WID102	A	10	\$75
WID102	B	1	\$80
WID102	C	1	\$80
WID103	A	1	\$80
WID103	A	5	\$70
WID103	B	1	\$80
WID103	C	1	\$80
WID103	C	40	\$75
WID104	A	1	\$80
WID104	B	1	\$80
WID104	B	30	\$75
WID104	B	50	\$60
WID104	C	1	\$80

TABLE 7: MATERIAL–QUANTITY–PRICE LIST

Material #	Description	Quantity	Price
WID101	Widget Blue	1	\$100
WID101	Widget Blue	50	\$97
WID101	Widget Blue	100	\$90
WID102	Widget Green	1	\$100
WID103	Widget Yellow	1	\$100
WID104	Widget White	1	\$100
WID104	Widget White	40	\$91
WID104	Widget White	80	\$85
WID105	Widget Black	1	\$100
WID106	Widget Blue	1	\$100
WID107	Widget Orange	1	\$100
WID107	Widget Orange	75	\$91
WID107	Widget Orange	120	\$88

TABLE 8: HOLIDAY DISCOUNT ON ALL ITEMS

Material #	Discount
(All Items)	15.00%

TABLE 9: CUSTOMER–MATERIAL–DISCOUNT

Customer #	Material	Cash Discount
25006	WID101	20.00%
25006	WID102	20.00%
25006	WID103	20.00%
25006	WID107	20.00%
25007	WID102	15.00%
25007	WID103	20.00%
25007	WID106	15.00%

TABLE 10: MATERIAL–CUSTOMER CLASS–DISCOUNT

Material #	Class	Cash Discount
WID101	A	15.00%
WID101	C	21.00%
WID102	B	17.00%
WID102	C	19.00%
WID103	A	10.00%
WID103	B	11.00%
WID103	C	11.00%
WID104	A	16.00%
WID104	B	18.00%

TABLE 11: MATERIAL–MASTER WITH DISCOUNT DATA

Material #	Description	Material Discount	Tax Classification
WID101	Widget Blue	10.00%	0
WID102	Widget Green	30.00%	1
WID103	Widget Yellow	10.00%	0
WID104	Widget White	10.00%	1
WID105	Widget Black	10.00%	1
WID106	Widget Blue	10.00%	1
WID107	Widget Orange	17.00%	0

TABLE 12: TAX INPUT AND OUTPUT

Input Code	Output (Sales tax rate)
TX0000000	6.25%
NM0000000	5.13%
AR0000000	6.25%
CA0000000	7.15%
LA0000000	4.45%

Appendix B. Teaching Module Solutions

SALES ORDER 1

Customer #: 25001		Customer Class: B	
Material #	Quantity	Price	Quantity * Price
WID107	100	\$100	\$10,000
WID104	5	\$85	\$425
WID101	80	\$75	\$6,000
Total			\$16,425

SALES ORDER 2

Customer #: 25005		Customer Class: A	
Material #	Quantity	Price	Quantity * Price
WID102	9	\$73	\$657
WID105	15	\$100	\$1,500
WID106	40	\$74	\$2,960
Total			\$5,117

SALES ORDER 3

Customer #: 25007		Customer Class: B	
Material #	Quantity	Price	Quantity * Price
WID103	1	\$86	\$86
WID104	45	\$76	\$3,420
WID107	20	\$79	\$1,580
Total			\$5,086

SALES ORDER 4

Customer #: 25006		Customer Class: A	
Material #	Quantity	Price	Quantity * Price
WID101	100	\$54	\$5,400
WID103	5	\$70	\$350
WID107	80	\$65	\$5,200
Total			\$10,950

SALES ORDER 5

Customer #: 25006		Customer Class: A	
Material #	Quantity	Price	Quantity * Price
WID101	9	\$69	\$621
WID105	15	\$100	\$1,500
WID106	40	\$100	\$4,000
Total			\$6,121

SALES ORDER 6

Customer #: 25007		Customer Class: B	
Material #	Quantity	Price	Quantity * Price
WID103	1	\$65	\$65
WID104	45	\$75	\$3,375
WID107	20	\$100	\$2,000
Total			\$5,440

SALES ORDER 7

Customer #: 25001		Customer Class: B		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID101	100	\$80	15%	\$6,800
WID104	5	\$80	18%	\$328
WID107	80	\$91	17%	\$6,042.40
Total				\$13,170.40

SALES ORDER 8

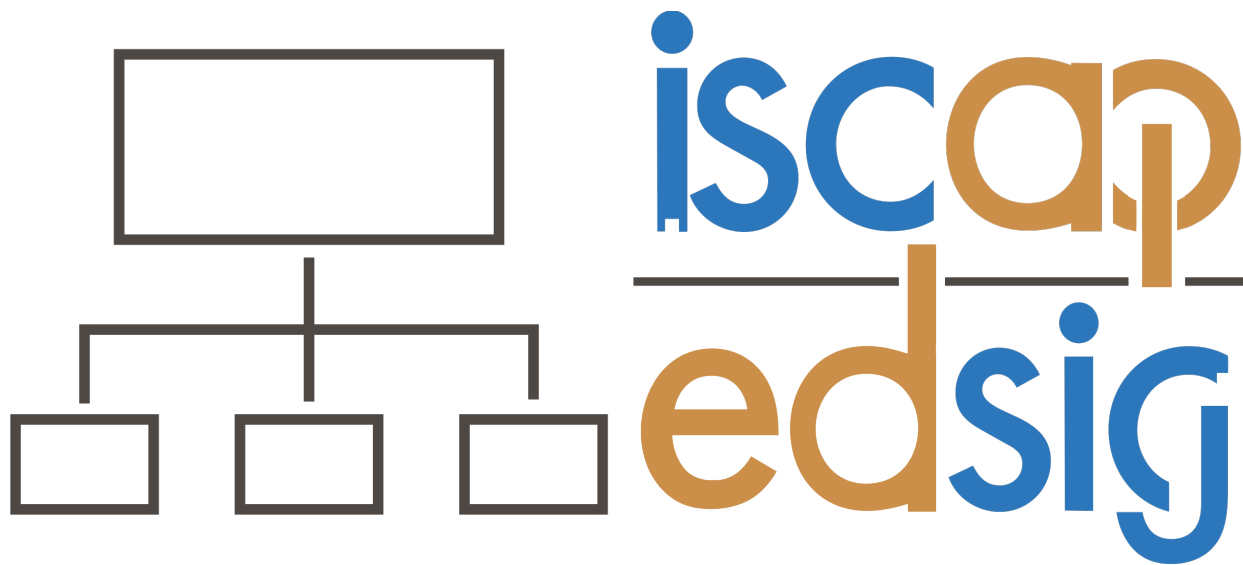
Customer #: 25005		Customer Class: A		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID102	9	\$80	30%	\$504
WID105	15	\$100	15%	\$1,275
WID106	40	\$100	15%	\$3,400
Total				\$5,179

SALES ORDER 9

Customer #: 25007		Customer Class: B		
Material #	Quantity	Price	Discount	Discounted Price * Quantity
WID103	4	\$65	20%	\$208
WID104	45	\$75	18%	\$2,767.50
WID106	20	\$70	15%	\$1,190
Total				\$4,165.50

SALES ORDER 10

Customer #: 25005		Customer Class: A				
Material #	Quantity	Price	Discount	Discounted Price * Quantity	Sales Tax Rate	Line Total
WID101	100	\$80	0.15	6,800	0.00%	\$6,800
WID104	5	\$80	0.16	336	6.25%	\$357
WID107	500	\$88	0.17	36,520	0.00%	\$36,520
Order Total						\$43,677



**Information Systems & Computing Academic Professionals
Education Special Interest Group**

STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the *Journal of Information Systems Education* have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©2023 by the Information Systems & Computing Academic Professionals, Inc. (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to the Editor-in-Chief, *Journal of Information Systems Education*, editor@jise.org.

ISSN: 2574-3872 (Online) 1055-3096 (Print)