Teaching Tip
Teaching NoSQL Databases in a Database Course for Business Students

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ABSTRACT

NoSQL databases have been used in organizations for decades. Few database textbooks on the market, however, have suitable materials about NoSQL beyond general introductions for typical business students. In fact, users of the typical NoSQL systems on the software market need to have certain computer programming skills. This teaching tip introduces a small unit on NoSQL databases in a traditional database course for students in all business majors. The unit uses a Microsoft Excel-based NoSQL database example to explain the basis of NoSQL, describes the four essential types of NoSQL databases, and discusses representative NoSQL database management systems on the software market. As this unit does not require computer programming skills, it can be easily integrated into an existing relational database course for business students. The unit was tested twice. Students have demonstrated positive first-hand practice experiences of NoSQL beyond general concepts of NoSQL.

Keywords: NoSQL, Database design & development, Relational database, Excel

1. INTRODUCTION

Along with the fast development of big data analytics and cloud computing, more and more organizations are using NoSQL databases in addition to traditional relational databases (Bajaj & Bick, 2020). There are dozens of popular NoSQL database management systems (DMBS) on the software market, and each of them has its target applications and distinctive user-interface (Brahim et al., 2016; Madison et al., 2015). NoSQL databases are different from relational databases in that there is no single data model for all types of NoSQL databases while all relational databases are based on the relational model. There is no typical NoSQL DBMS for students to learn the diversified features of NoSQL databases. More importantly, the user-interfaces of NoSQL DBMS on the software market are dissimilar, and usually require computer programming skills to use (Fowler et al., 2016; Hwang, 2018). Teaching NoSQL databases to typical information systems students lags far behind the development of NoSQL databases. After decades of the proliferation of NoSQL databases, the information systems community is still searching for feasible pedagogies of NoSQL that can be incorporated into traditional undergraduate database courses in information systems curricula (Bajaj & Bick, 2020).

This teaching tip describes a small unit of NoSQL databases in a traditional database course for typical business students who are not particularly interested in computer programming. The NoSQL database unit uses an illustrative example of Microsoft Excel-based NoSQL databases for business document management. It highlights the fundamental differences between NoSQL databases and relational databases, explains the different contexts of applications of NoSQL databases and relational databases, describes four basic types of NoSQL databases and their fundamental data models, and introduces representative NoSQL DBMS on the software market.

2. A BRIEF LITERATURE REVIEW

Previously, NoSQL referred to "non-relational" or "non-SQL", but it actually means "Not only SQL". This is because NoSQL systems not only describe non-relational database systems but also commonly support SQL-like query languages and/or include relational (SQL) databases in integrated polyglot architectures (Berg et al., 2013). NoSQL is mainly aimed at non-relational data models that allow organizations to store and use large amounts of variable and unstructured data when the

flexibility of data resource management and process speed, instead of data redundancy, are the major concerns. There have been many types of NoSQL databases with diversified data models, implementation strategies, corresponding features, strengths, and drawbacks (Davoudian et al., 2018; Stonebraker, 2010). While researchers are still searching for other data models for NoSQL databases, efficiencies of data processing with NoSQL in the cloud environment for big data are the major concern in the recent NoSQL databases field (Imam et al., 2018; Nadeem et al., 2017). NoSQL approaches are rather pragmatic without restriction rules, depending upon the nature of the target applications. Currently, the user-interfaces of typical NoSQL systems require computer programming skills to use (Ahmadian et al., 2017; Ravat et al., 2020).

On the business education side, the concept of NoSQL and topics of applications of NoSQL for business should be incorporated into information systems curricula (Lending et al., 2019). Knowledge about NoSQL enables business students to develop skills for discovering knowledge using diversified databases to meet the different applications of business analytics (Woods, 2020). The literature has indicated that, in comparison with typical relational databases courses, standalone NoSQL databases courses require more computer programming components (Greiner, 2021; Kim, 2020; Mohan, 2018).

3. OVERVIEW OF THE NOSQL UNIT

3.1 The Background of the Database Course
The database course which includes the NoSQL unit is open to all undergraduate business majors. Its only prerequisite is an introductory information systems course which is a required core business course for all business majors. The database course teaches basic file organizations and B-tree, relational data model (entity-relationship model), normalization, SQL, physical database design techniques, and other topics related to distributed databases and data warehouses. The course requires students to complete assignments of problem-solving questions for each unit and a relational database project in Microsoft Access with no less than seven tables. Each student uses an assigned hypothetical or approved business topic for the relational database project.

3.2 The NoSQL Unit
3.2.1 Context of NoSQL Unit in the Database Course. The major subject of the database course is relational databases. The NoSQL databases unit is the last unit of the database course. The lecture time and the out-of-class time of the NoSQL unit use about 10% of that of the entire database course. Before learning the NoSQL unit, students have learned the relational data model. They understand that the development of a relational database must go through a rigorous process of logical design to generate a formal relational database schema to ensure the accuracy and integrity of the data. In the past recent years, many students expressed their interest in NoSQL databases.

3.2.2 Introduction of the NoSQL Unit. The introduction of the unit presents the definition of NoSQL and the causes of NoSQL. It explains that the relational data model should be applied whenever applicable; however, there are many cases where relational databases are infeasible or are inefficient.

(1) Unstructured data sets which do not have pre-defined relational data models (schemata), e.g.,
- documents and textual data without clear relationships between the data items
- graphical and audio data.

(2) Structured data sets with uncertain relationships between the data items, e.g.,
- the entities and attributes of the data set change frequently
- the entities of the data set have no commonly accepted primary key.

(3) Data redundancy is not a major concern, but data retrieval speed is a major concern and approximate results of data retrieval are acceptable, e.g.,
- big data from different data sources stored in the cloud
- real-time web applications.

Because NoSQL is mainly aimed at non-relational data models when the flexibility of data resource management and process speed, instead of data redundancy, are the major concerns, NoSQL approaches are rather artistic without restriction rules, depending upon the nature of the target applications. Thus, there is no NoSQL "standard". Each NoSQL system has its unique user-interface environment. Unlike relational databases and SQL which can be understood through learning one typical database system, NoSQL platforms differ from each other in many aspects, and there is no single "typical" NoSQL platform for learning diversified NoSQL applications.

3.2.3 An Illustrative NoSQL Database Example in Microsoft Excel. To use any typical NoSQL database systems on the software market, the user needs to have computer programming skills at a certain level. To explain the motivation, benefits, and limitations of NoSQL to ordinary business students with no sufficient computer programming skills, the NoSQL unit uses an illustrative example of NoSQL in Microsoft Excel spreadsheet. The unit reminds students to recall that Excel spreadsheets should not be used for relational data management because they often introduce uncontrollable data redundancy and violation of data integrity. The present illustrative NoSQL example demonstrates that Excel can be used for NoSQL databases in some cases where data redundancy is not a major concern and the data structures can be flexible without rigorous relational database schema.

The application of the illustrative NoSQL example is business document management. Documents are valuable data for organizations as well as individuals. In fact, document management is an important type of NoSQL application in the digitalization era. The present example is a business document management system used for a department of online help customer service to store and access the customer service records. The scenario of this business document management application is described as follows.
- The online customer service department records every interaction between the responsible agent and the served customer, and stores the interaction records in the system.
- The business document management system checks the customer's data and extracts the available key characteristics of the interaction, including the last order number, shipping number, billing number, etc.

- The responsible agent records the concerned issue of the present interaction.
- The business document management system records the physical storage location of the interaction record in the cloud.

The NoSQL database example starts with an ordinary Excel spreadsheet as shown in Figure 1. The unit provides a step-by-step tutorial for students to convert the Excel spreadsheet into a NoSQL database and to learn the Excel NoSQL database example.

Figure 1. Excel Datasheet of the NoSQL Database Example

Step 1. Load the sample data (see Appendix) in Excel as an ordinary data sheet, as shown in Figure 1.

Step 2. Start Excel. Click on [Data] on the top menu, and select [Get Data]. The user is allowed to import data. In this case, choose [From File], and then [From Worksheet] (see Figure 2). The user can import the Excel file in Figure 1 into the current Excel worksheet for a NoSQL practice.
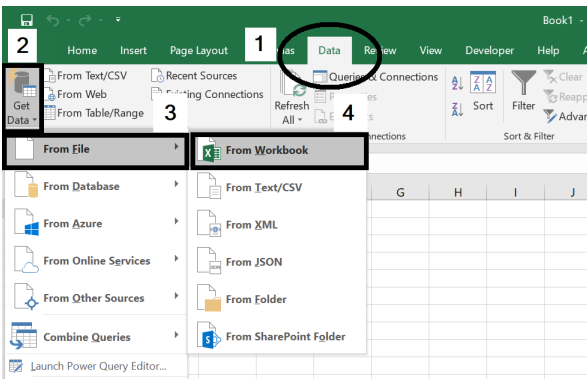

Figure 2. Use Microsoft Excel to Import Data to Form the NoSQL Database

Step 3. The user will see the Excel-based NoSQL database, as shown in Figure 3. Working on the NoSQL database, click on [Query] on the top menu, and select [Edit] (see Figure 3). The user will see the Power Query Editor window that allows the user to edit queries.

Step 4. As a practice, the query is to "*find the document Storage Links, Timestamps, and Issues of all customer service records related to Customer 'Mary' and Agent 'Gill'.*" In the

Power Query Editor window, select [Choose Columns] to choose Timestamp, Customer, Agent, Issues, and Storage Link for the query (see Figure 4).

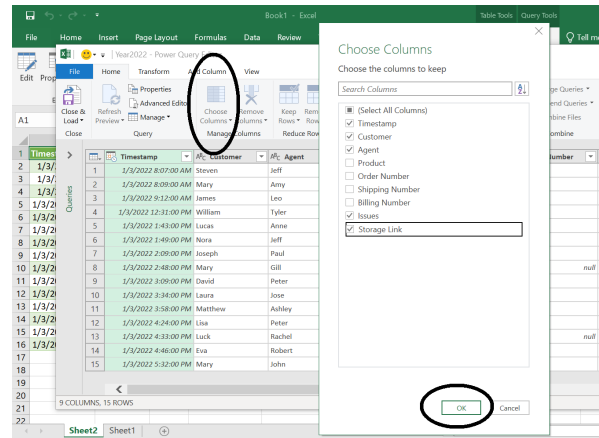**Figure 3. The NoSQL Database for the Business Document Management**

Figure 4. The Query Tool in Excel for NoSQL Query

Step 5. To set the search conditions for the query, click on the expand button beside the Customer column, and choose "*Mary*" (see Figure 5). In the same way, the user sets the condition for Agent "*Gill*". The query result will be displayed (see Figure 6).

As shown in Figure 6, when the user chooses [Advanced Editor] in the Power Query Editor window, the Excel query code of the query will be displayed. Apparently, the query tool used for searching documents in Excel is not SQL-based.

As shown in the NoSQL database in Figure 3, the primary key is artificial to record the sequence of document data stored in the database. In this case, the primary key is in fact not a part of the data, and is represented by the row numbers of the Excel spreadsheet. There are several tags, or tag keys, to define the properties of the documents. The last tag in the example specifies the storage address of each document. The names of tags are determined by the database designer. The number of tags could be changed as needed. Excel has many built-in query functions which support imperative queries to some degree. Imperative queries are different from SQL which is called a declarative query language. An imperative query has to specify step-by-step instructions for the query while a declarative query declares the wanted result but not the search steps.
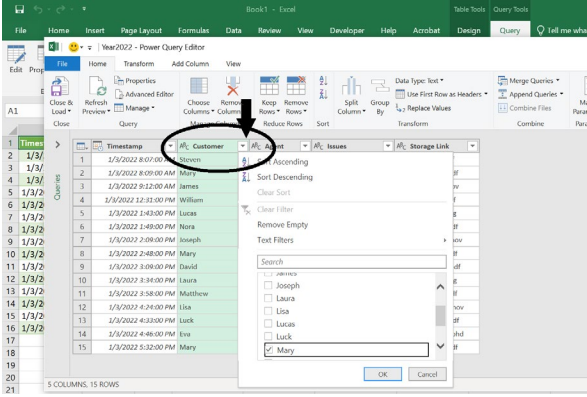
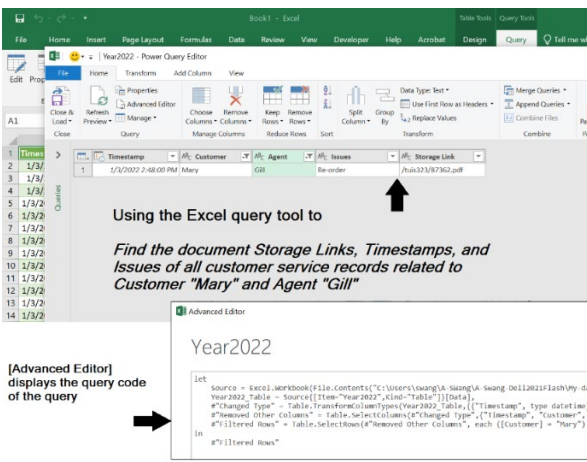**Figure 5. Set Search Conditions for the Query**

Figure 6. The NoSQL Query Result and the Query Code

The NoSQL database has the following characteristics that make it impossible to become a relational database.

- The number of tags (or attributes in the relational database term) can be expanded as needed
- There is no formal schema because new tags could be added from time to time, and functional dependencies between the tags (or attributes in the relational database term) are difficult to define
- Each cell could have a missing value or multiple values (e.g., multiple keywords in a single cell)
- Data redundancy is not a major concern
- As the word-based values of tags (e.g., Issues) can be ambiguous, imperative queries are often needed to find preferred results.

3.2.4 Four Basic Types of NoSQL Databases. There are many types of NoSQL databases. Vera-Olivera et al. (2022) provides a comprehensive literature review of NoSQL databases along with an inclusive list of references. The NoSQL unit provides an overview of four basic types of NoSQL databases that are commonly studied and used in the NoSQL community.

(1) Key-value-based. Key-value-based NoSQL databases are the least complicated types of NoSQL databases. In key-value-

based NoSQL databases, data are stored in key-value pairs. They use arbitrary strings to represent keys, and the value of the key can be a document or image. Key-value-based NoSQL databases do not have a specific schema. This type of NoSQL database is designed to handle a large amount of data and heavy processing load. Figure 7 illustrates the simple structure of key-value-based NoSQL databases.
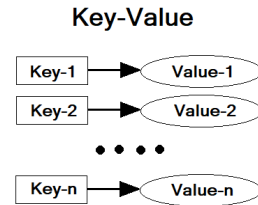

Figure 7. Key-Value-Based NoSQL Database

When the key-value pairs are as simple as rows of a single table in relational databases, a key-value-based NoSQL database has no substantial difference from a relational database with a single table. However, when the keys can contain different combinations of key components, the key-value pairs can no longer be a simple table in the relational model. When the amount of data is huge (e.g., shopping carts contents of a large e-commerce company), key-value-based NoSQL databases with the simple data model and complicated key structures have much higher performance than their comparable relational databases.

Pure key-value-based NoSQL databases do not need a query language, but use very simple commands, such as *Get*, *Put*, and *Delete* to retrieve, save, and delete data. Modified key-value-based NoSQL databases may include full-text searches.

(2) Document-oriented. Document-oriented NoSQL databases store and retrieve data in a hierarchical model, as illustrated in Figure 8. The documents in document-oriented NoSQL databases are commonly stored in XML formats. The unit reminds students to learn from another unit about XML in the database course that XML defines a set of rules for encoding documents in a hierarchical model for computer processing. It stresses that a table in a relational database can be readily converted into an XML document; however, when a complicated relational database with multiple tables is converted into an XML hierarchy, redundant data must be introduced or pieces of relationship information will be lost. Thus, XML documents are not relational databases.

Physically, each node in the hierarchy structure of a document-oriented NoSQL database can be any form of data. Document-oriented NoSQL databases are mostly used for website content management systems (CMS), blogging platforms, real-time analytics, e-commerce applications, and natural language processing.
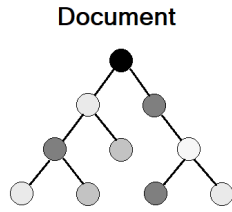
Document

Figure 8. Document-Oriented NoSQL Databases

(3) Graph-based. Graph-based NoSQL databases use graph structures for queries with nodes, edges (or relationships between the nodes), and properties attached to the edges to represent and store data. The relationships allow the stored data to be linked together directly and retrieved. Relationships can be intuitively visualized using graph databases, making them useful for heavily inter-connected data. Figure 9 illustrates graph-based NoSQL databases.
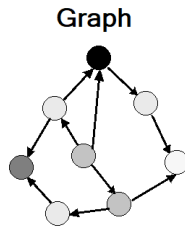
Graph

Figure 9. Graph-Based NoSQL Databases

Actually, an ER model can be viewed as a graph with special rules of entity-relationship for relational databases. Graph-based NoSQL databases are different from relational databases in two aspects. First, the structures of graph-based NoSQL databases can be more flexible than ER models. For example, the nodes in graph-based NoSQL databases can have more forms than tables, and the properties attached to the edges can be more complicated than simple one-way relationships. Second, while tables in relational databases are loosely connected, graph-based NoSQL databases can operate through linked chains of edges with high performance in graph processing.

Graph-base NoSQL databases are mostly used for social networks, logistics, spatial data, and natural language processing. At this point, there are a wide variety of graph-based NoSQL database systems and there is no universal graph query language for NoSQL databases.

(4) Column-based. Column-based NoSQL databases work on columns. Every column is treated separately. Column-based NoSQL databases are widely used to manage data warehouses, business intelligence, customer relationship management, and e-commerce. Figure 10 illustrates the column-based NoSQL databases. The data model in column-based NoSQL databases is flexible. Column-based NoSQL databases deliver high performance on aggregation queries that are readily available in columns. As adding new columns and modifying columns do

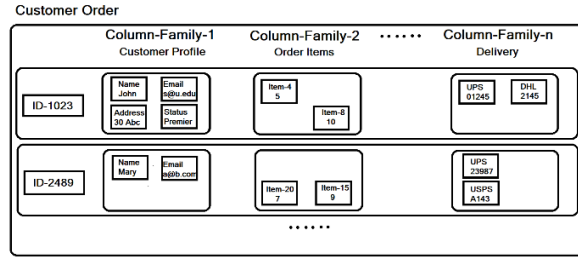not disrupt the whole database, column-based NoSQL databases have good scalability.

Figure 10. Column-Based NoSQL Databases

Many NoSQL databases are combinations of the above four basic types of NoSQL databases to solve unstructured problems in pragmatic ways. The illustrative example of Excel-based NoSQL databases in Figure 3 is an example of a combination of key-value and column-oriented methods for a flexible and scalable application of business document management.

3.2.5 Representative NoSQL DBMS on the Software Market. The term NoSQL covers a wide array of database types. Naturally, there are many NoSQL DBMS, and each of them has its unique target application domain as well as distinctive features and user-interface style. There is no standard NoSQL language. As discussed in the previous section, the queries in NoSQL databases are more imperative than declarative, and the use of NoSQL DBMS usually demands for third-generation computer language (e.g., C, Java, JavaScript, etc.) programming skills.

An "on-premise" NoSQL DBMS uses in-house servers and IT infrastructure within the organization for greater protection. Many NoSQL DBMS provide "cloud service" of NoSQL database applications in the cloud in the form of Software-as-Service (SaaS). A NoSQL database platform can be "on-premise" and/or "cloud service."

The NoSQL unit discusses several representative NoSQL DBMS on the software market.

- **MongoDB** (www.mongodb.com/) is a document-oriented NoSQL DMBS. It is highly scalable and available in both open source and commercial enterprise versions. It can be run on-premises or as a managed cloud service. The managed cloud service is called MongoDB Atlas. A MongoDB database has a flexible and dynamic schema. The "documents" in MongoDB use diversified forms to store structured and unstructured data.
- **Oracle NoSQL Database** (www.oracle.com/database/nosql/) is a distributed key-value NoSQL DBMS. It uses a tabular model and provides interactive transactional semantics for data manipulation. Each row of tabular is identified by a unique key, and has a value which is interpreted by the application.
- **Ontotext GraphDB** (www.ontotext.com) is a graph-based NoSQL DBMS. It provides a suite for text mining, semantic annotation, and data integration tools that can transform data into graph models as semantic networks for knowledge sharing.

- **Amazon DynamoDB** (aws.amazon.com/dynamodb) is a cloud service NoSQL database platform that supports key-value-based and document-oriented data structures. It is serverless with no servers, and requires no software to install, maintain, or operate. DynamoDB automatically scales tables up and down to adjust for capacity and maintain performance. It provides both provisioned and on-demand capacity modes so that users can optimize costs by specifying capacity per workload, or paying for only the resources consumed.
- **Apache Cassandra** (cassandra.apache.org/) is a free and open-source, distributed, column-based NoSQL DBMS designed to handle large amounts of data across many commodity servers. Cassandra offers support for clusters of multiple datacenters. Cassandra was designed to implement a combination of Amazon's DynamoDB distributed storage.
- **IBM Cloudant** (ibm.com/cloud/cloudant) provides NoSQL distributed database cloud-based service. Cloudant's service provides integrated data management, search, and analytics engine designed for web applications. It can be used to develop key-value-based, column-based, and document-oriented NoSQL databases with the advantage of big data being redundantly distributed over multiple machines.
- **Microsoft Azure Cosmos DB** (azure.microsoft.com/) is a distributed NoSQL DBMS that supports multiple data models (key-value-based, documents-oriented, graph-based, and column-based) and good application development interfaces for data from other database systems such as MongoDB, Cassandra, SQL, and other systems. It can be used for a wide range of business applications.

As discussed above, some NoSQL DBMS (e.g., Oracle NoSQL Database and Ontotext GraphDB) concentrate on a specific type of NoSQL database, others (e.g., Amazon DynamoDB and Apache Cassandra) support several types of NoSQL databases, yet others (e.g., Microsoft Azure Cosmos DB) emphasize business application development and integration of data from various NoSQL database platforms.

3.3 Teaching Suggestions

The NoSQL unit is to expand business students' learning of data resource management in traditional database courses. Students learn this NoSQL unit through two home assignments after the class lectures. The first assignment is a group exercise. Students work in teams with two or three people, reproduce the Excel-based NoSQL database example in Figure 3 for their own applications, and upload the Excel-based NoSQL database artifact to the OneDrive cloud for the team to share, add columns, and update the contents. The report of the project needs to explain why the developed NoSQL database is different from a relational database.

The second assignment is an individual exercise. Students are required to search the Internet and find an open-source NoSQL DBMS, learn the NoSQL DBMS through tutorials posted on the websites or YouTube, and write a short essay to explain the target application of the NoSQL DBMS and its pros and cons. As the major subject of the current database course is relational database, the workload of the two assignments was light.

4. EVIDENCE

Lending and Vician (2012) suggested that the value of a teaching tip can be evidenced by the replicability of the teaching innovation and the test results of students' learning improvement. The present teaching tip presents an innovative approach to introducing NoSQL to students in all business majors using an Excel-based NoSQL database example. The sample dataset of the example in Figure 1 is exhibited in Appendix. The exercise steps described in this tip are straightforward for readers to replicate the example. All teaching materials, including the text of the unit, lecture Power Point slides, example artifacts, are available upon request.

The NoSQL unit has been taught by one of the authors twice in an English online database course for students in business majors of a university in East China. A simple survey with two questions was distributed to the two classes before teaching the NoSQL unit. The two questions were "*Do you understand the basics of NoSQL databases and the differences between NoSQL databases and relational databases? If yes, explain briefly.*" and "*Have you taken a computer language course? If yes, explain the course(s).*" The survey results indicated that no one in the two classes with forty six (46) students claimed understanding of the basics of NoSQL such as the differences between NoSQL databases and relational databases or first-hand experience of NoSQL databases. No student in the two classes had taken a college-level computer programming course beyond SQL learned from the present database course, although ten (10) students learned programming in high schools. The two assignments of the NoSQL unit were assessed by the instructor. As this unit is a minor part of the database course which concentrates on relational databases, the grade of each of the two assignments counted for only 2% of the course grade. The rubrics of the two assignments were simple as described below.

- Assignment-1:
  - The Excel NoSQL database is fully functional for queries (1% of the course grade)
  - Excellent documentation of the NoSQL database of the business application (which is similar to the steps of the tutorial) (1% of the course grade)
- Assignment-2:
  - Excellent documentation of an open-source NoSQL DBMS, including at least ten (10) screenshots from YouTube video clips of the NoSQL DBMS, to explain the major steps of use of the NoSQL DBMS (1% of the course grade)
  - Thorough explanation of a use case of the NoSQL DBMS for business (1% of the course grade).

All students' assignments received 3.6% or above of the course grade, indicating that the NoSQL unit did provide useful lessons for business students to learn the basics of NoSQL. Five (5) students provided specific positive comments in the teaching evaluations to express their positive experience with NoSQL databases.

The observations of evidence were preliminary. After a comprehensive literature search, the authors did not find any pedagogical report of teaching NoSQL in an ordinary database course for business students in all majors. Also, teaching NoSQL using Excel is an initial trial. Thus, a further comparative assessment of the teaching method in comparison with prior similar research has not been conducted. Potential

subjects for future investigations include more analyses of the design of the materials of this subject and additional assessments of the learning outcomes. Potential subjects for future investigations include more analyses of the design of the materials of this subject and additional assessments of the learning outcomes.

5. DISCUSSION

The data models behind NoSQL databases are diversified, ranging from file systems (e.g., index files and hashing function-based random files) to hierarchical data models, network data models, and object-oriented data models. The basic concepts of these data models used in NoSQL databases are not really new. Many data storage techniques that support these data models have been used in databases for longer than a half century. After a quite long journey, relational databases have become the dominant and mainstream databases in almost every organization. Nevertheless, along with the proliferation of big data and cloud computing, NoSQL databases are attracting more attention in many areas of information technology. As discussed in the previous sections of this teaching tip, NoSQL databases are not easy to design and use for end-users in business organizations. Unquestionably, business students need to learn NoSQL databases in the big data era. Learning a single NoSQL database system, however, might be good for the understanding of a particular type of application of NoSQL and its data model, but does not provide a broad view of NoSQL in general. More importantly, practicing third-generation computer programming languages to learn a single type of NoSQL application does not serve the best interest of typical business students. This teaching tip addresses these issues and provides a solution. Hence, this teaching tip makes a positive contribution to information systems education by providing basic components of NoSQL with less programming requirements for all business students.

The presented approach to conveying NoSQL concepts emphasizes sidestepping the programming requirements for business students in all majors. The example of NoSQL in Excel is used to illustrate the basic concept of NoSQL. This NoSQL unit is merely an introduction to a possible full-scale NoSQL database course for business students who are interested in programming and wish to gain a deeper understanding of NoSQL databases in the industry.

6. CONCLUSIONS

The inclusion of essential knowledge about NoSQL in a traditional relational databases course for all business students is an imperative task for information systems educators. This teaching tip presents a unit of NoSQL for business students to expand their knowledge set with databases in a traditional database course because wide-ranging database technologies are important subjects in business programs. Currently, all typical NoSQL DBMS on the software market require extensive technical and computer programming languages skills for installation, creation, and manipulation. On the other hand, computer programming languages are not a major interest for most business students. In our experience, the difficulties in using computer languages discourage business students to learn NoSQL with first-hand practice experience if a typical NoSQL DBMS is used. To address this problem, a NoSQL unit with an Excel-based NoSQL database example has been designed and introduced in our database course for all business students.

The teaching tip presents the original pedagogical design and contents of the NoSQL unit for business students. The preliminary study of student performance evaluations has indicated students had positive learning experiences with NoSQL. After exercising the Excel-based NoSQL example, students had no difficulty in creating their own Excel NoSQL databases within a short timeframe to understand the different contexts of relational databases and NoSQL databases. The progressive nature of NoSQL database development accommodates differing levels of preparation for learning NoSQL and sets the stage for students to progress to advanced levels on their own. The design and delivery of the NoSQL unit have demonstrated that knowledge about NoSQL is practicable and very useful for business students. The paper can be valuable for instructors who wish to incorporate a small unit of NoSQL in their traditional database course for all business students.

7. ACKNOWLEDGEMENTS

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APPENDIX

Data Sample for the Excel NoSQL Example

1. Copy the following data sample and paste it in Notepad as Plain Text.

```
Timestamp,Customer,Agent,Product,Order Number,Shipping Number,Billing Number,Issues,Storage Link
1/3/2022 8:07,Steven,Jeff,N95 Mask,GD34209,TR31110,ZD490211,Shipping delay,/gixk309/9801.pdf
1/3/2022 8:09,Mary,Amy,P71 Digital Piano,TR29801,HL49503,,Wrong product,/klsu409/31010.pdf
1/3/2022 9:12,James,Leo,SecureCam,AC38212,ZH34899,AB593983,Return policy,/iphg202/1454.mov
1/3/2022 12:31,William,Tyler,, , ,,Information accuracy,/ujua282/4871.pdf
1/3/2022 13:43,Lucas,Anne,Ktelescope,RT22888,UP28939,DC872929,Wrong product,/ljba190/67978.jpg
1/3/2022 13:49,Nora,Jeff,S20 Cell Phone,DG32345, ,,Re-order,/vbsw891/2342.pdf
1/3/2022 14:09,Joseph,Paul,Fsmartwatch,XS24900,UP49291,,Shipping delay,/hakl489/29211.mov
1/3/2022 14:48,Mary,Gill ,Y88 Digital Piano,TR29801,,,Re-order,/tuis323/87362.pdf
1/3/2022 15:09,David,Peter,, ,SY27930,RE829210,Confirmation,/xcep489/29030.pdf
1/3/2022 15:34,Laura,Jose,E-SmartBikes,JU38281,DS28379,DC389201,Payment,/bmal498/6474.jpg
1/3/2022 15:58,Matthew,Ashley,Robotic Mower,JK14039,UP38923,HT390184,Return
policy,/snou109/2090.pdf
1/3/2022 16:24,Lisa,Peter,Cordless Vacuum,FV34340,HL89191,JK9482021,Shipping
errors,/ewtt7469/4802.mov
1/3/2022 16:33,Luck,Rachel,55in Smart TV,AS82201,,,Confirmation,/yvfe2478/3584.pdf
1/3/2022 16:46,Eva,Robert,Ice Maker,YB32122,DS37822,WR372828,Poor packing,/njum3982/7272.phd
1/3/2022 17:32,Mary,John,Y88 Digital Piano,RS28081,UP78221,,Confirmation,/rttp982/47259.pdf
```

2. Open the Notepad text file in Excel. In the Text Import Wizard pane, choose Delimited, click on Next, choose Comma, and click on Finish. The sample data are loaded in Excel (see Figure 1).

3. Follow the steps in Section 3.2.2 to create and practice the Excel NoSQL database example (see Figures 3-6).
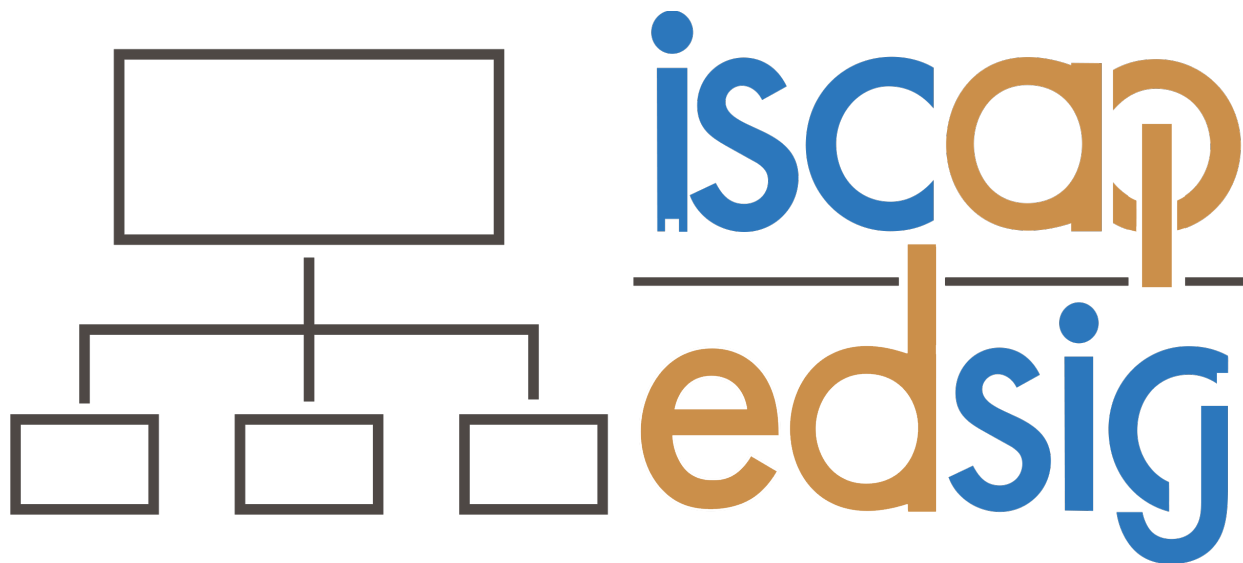
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