THE IMPLICATIONS OF BIG DATA FOR THE ENTERPRISE SYSTEMS FOR SMALL BUSINESSES

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Abstract: This article explores the implications of big data on small business enterprise systems. Possible issues include: 1) What areas in small business enterprise systems are impacted the most? 2) What algorithms/programs will be used for big data for enterprise systems for small businesses? This article focuses on the Microsoft framework for small businesses and how it can be integrated with Microsoft Dynamics CRM and ERP.

INTRODUCTION

Big data and business analytics is one of the hottest topics in data analytics and enterprise information systems these days. In 2012, the U.S. government announced $200 million for the Big Data Research and Development Initiative which explored the possibility of using big data, or a large-scale database, to solve significant problems for the government. This funding became major incentives for big data research for many universities and IT companies. Table 1 (on the next page) shows some of the NSF funding for big data for universities in Michigan. McAfee and Brynjolfsson (2012) listed two scenarios for the application of big data in

Table 1. Recent NSF Grants on Big Data in Michigan Areas

Award No.	Title	Principal Investigator	Organization
1250680	Choose a Needle in a Big Data Haystack	H. Jagadish	University of Michigan - Ann Arbor
1319363	Graph-Based Techniques for Visual Analytics of Big Scientific Data	Chaoli Wang	Michigan Technological University
1331280	Collaborative Research on Event-based Analytics for Enhanced Prognostics Design in a Big Data environment	Jun Ni	University of Michigan - Ann Arbor
1251031	Collaborative Research: Real Time Observation analysis for Healthcare Applications via Automatic Adaption to Hardware Limitation	Rong Jin	Michigan State University
1319909	Supporting Efficient Discrete Box Queries for Sequence analysis on Large Scale Genome Databases	Sakti Pramanik	Michigan State University

business areas. Big data, by the name, is for large scale of data analysis. What are the implications of the big data for small businesses? Will big data have a place for small businesses? The purpose of this paper is to discuss the possible implications of big data for small enterprise systems such as Microsoft Dynamics.

THE DEFINITION FOR BIG DATA

Big data is similar to data mining and business intelligence but the scale of big data is much larger. In addition to the volume of the data, velocity and variability of the data are used to describe the characteristics of big data. Why has 'big data' suddenly become a buzzword? The first reason is the concept of in-memory computing which means handle the data in primary memory or random access memory. In the past, computers included primary memory such as RAM and second storage such as a hard drive. In the process of handling data, transfer frequently occurs between the RAM and hard drive. The processing speed of computers has reached a bottle neck because of the design. The newer ERP systems use in-memory systems and are more capable of handling large-scale data than before (Monk & Wagner, 2013).

The second reason is the popularity of social media and explosion of information that you can search on the Internet.   In traditional business intelligence, the data are based on the internal data generated from internal enterprise systems or customer relationship systems. The data used in these systems are also referred to as 'structured data'. Social networking became popular merely several years ago but generates a large amount of data in an alarming speed. Some data is very useful for data analysis. In addition, the capabilities of search engineers allow a person to find more useful information on the Internet for a subject. These external data are referred to as unstructured data. Big data process tries to general analysis from both structure and unstructured data.

LITERATURE REVIEW ON BIG DATA

Although big data is the continuation of data mining and business intelligence, research in the specific applications of big data is still in the early stage and under development. There are many discussion and applications in the biology (Marx, 2013), genomics (Ross, 2012), and medical areas (Chawla & Davis, 2013; Jee & Kim, 2013). In business application areas, the famous example is that Target use business analytics to figure out consumer behavior (Trank, 2013; Duhigg, 2012). Hill (2012) explained how Target using data mining tools for consumer behaviors.

**WHAT CAN BIG DATA DO FOR SMALL BUSINESS ENTERPRISE SYSTEMS?**

Many people think that big data is primarily for big enterprise systems but big data can be useful for small enterprise systems. By definition, big data should be processed in the large –scales enterprise systems because it is run on the mainframe computer systems which have more processing power which ideally for handling huge data. The price of a huge enterprise system is between 20 million and 100 million. Small businesses cannot spend millions of dollars in installing another big data project. Therefore, the small business must do it in a cost-effect way to do analysis. In addition, there is no need to buy huge enterprise systems if small enterprise systems can do the job. This is the reason why small enterprise systems such as Microsoft Dynamics CRM, GP, AX, and NAV still have a growing market. In addition, small enterprise systems still need business analytical functions. The concept of big data can help them improve the current systems.

**WHAT CAN BE DONE BY SMALL ENTERPRISE SYSTEMS REGARDING BIG DATA?**

Small businesses can apply the concept of big data for their current systems in the following areas:
1. **Enhance the hardware capabilities of small business systems**. Most small businesses use servers in the form of tower servers, rack-mount servers, and blade servers. Each component is still similar to a PC which has random access memory (RAM), processor, and hard drive. Because the RAM becomes cheaper and faster, small businesses can increase the use of RAM in the systems. In the storage device, solid-state drive (SSD) technology is proved to be faster than the traditional hard drives.

2. **Take advantages of latest operating systems**. The operating system is primarily either Linux or Microsoft-based server systems such as the Windows Server 2003, 2008, 2008 R2, and 2012. Microsoft 2008 and 2012 is 64 bits and allow more RAMS and faster processes.

3. **Use the SSIS function on SQL Server.** If we use the Microsoft Dynamics GP as the enterprise system for a small business, Figure 1 shows the relationship between enterprise systems and business analysis functions. As shown in Figure 2, big data analysis combines internal data and external data which come from social media, Internet, and other external data sources. An SQL Server Integration Service (SSIS) can be used to combine internal data and external data.
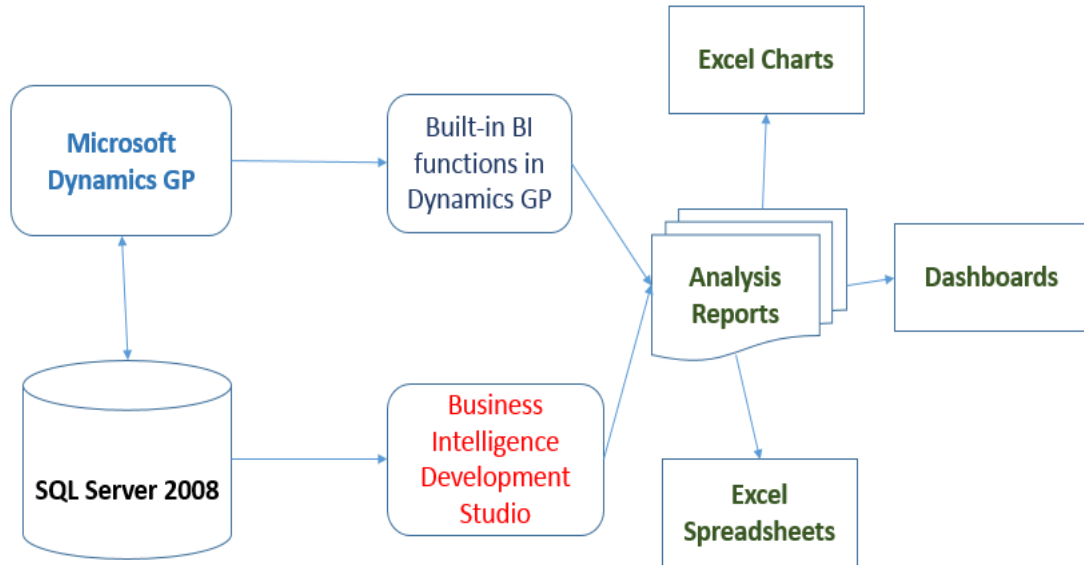

Figure 1. Relationship between Microsoft Dynamics GP and Business Intelligence for a Small Enterprise System
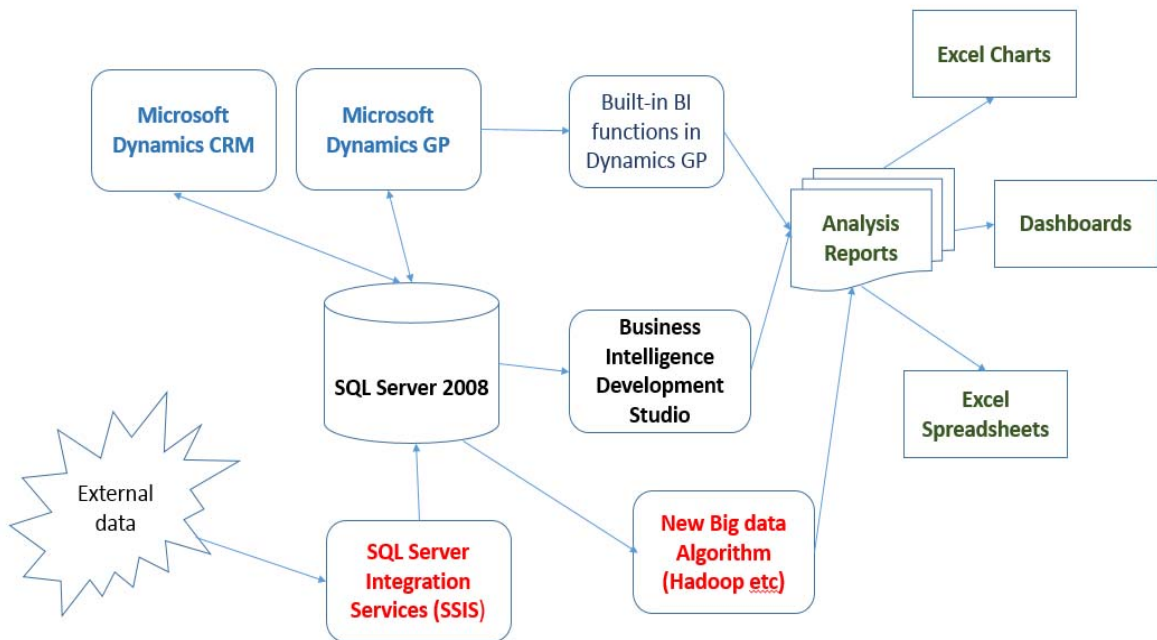
Figure 2. Suggested Relationship between Big Data and Microsoft Dynamics GP

4. **What algorithm/programs will be used for big data for enterprise systems for small businesses?**
Traditional algorithms for Business Intelligence Development Studio in Microsoft SQL Server include statistics (regression analysis, time series, and clustering), simple heuristics (decision trees), mathematics (neural network and Naïve Bayes), and Structured Query Language (SQL). In big data, there are more complex programs and algorithm such as NoSQL (also referred to as "not only SQL") and Hadoop® (Schultz, 2013). Hadoop and MapReduce, a software framework for writing applications, processes massive "amounts of data in parallel on large clusters consisting of thousands of nodes of commodity hardware" (The Apache Software Foundation, 2013; Lee & Chen, 2013). As shown in Figure 3, Microsoft basically developed tools based on Hadoop Framework.
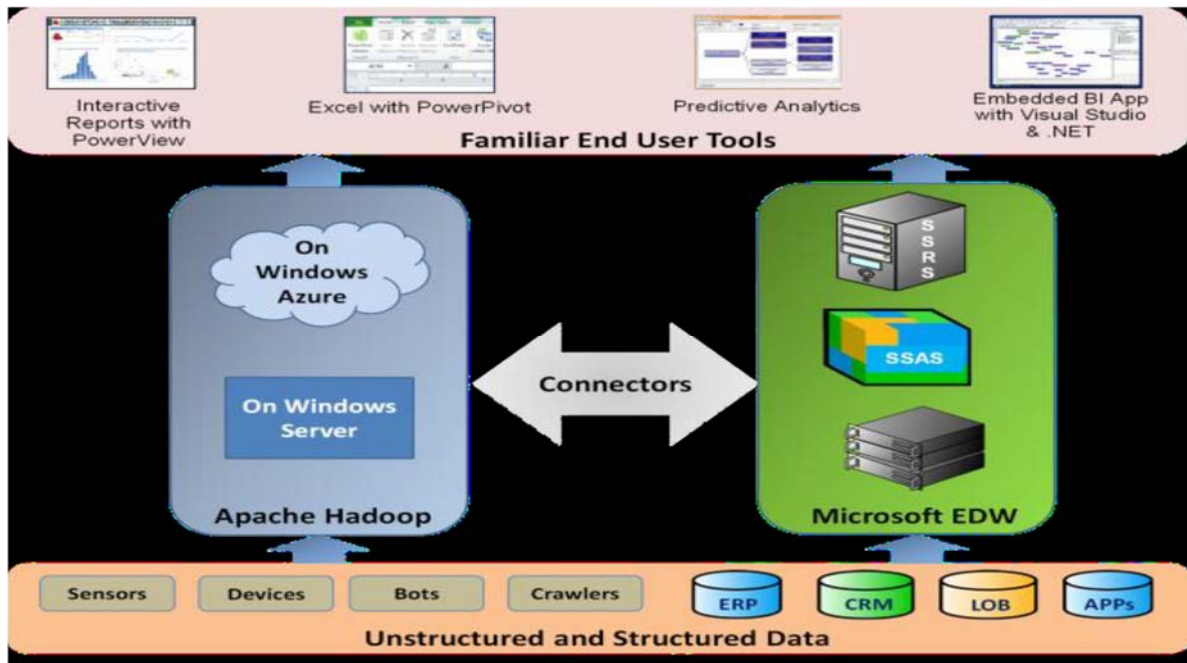
Source: Microsoft Big Data Solution Sheet, 2011

Figure 3: Microsoft Solution for Big Data

CONCLUSIONS

This paper discusses the implications of big data for small enterprise systems. We have used Microsoft Dynamics as an example to show what we can do to include the concept of big data. What areas in small business enterprise systems are impacted most? In enterprise systems, sales forecast, demand management, supply chain management, and finance are the most impacted areas. We will also see the use of cloud computing (such as Azure) for enterprise systems so that small companies can share the common results based on the analysis from the shared external data.

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