

## Chapter 27

# Integrating Business Intelligence Services in the Cloud: A Conceptual Model

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### **ABSTRACT**

*Business Intelligence (BI) solutions are among the popular applications that businesses demand in the Cloud. Although Business Intelligence functionality is already provided in the Cloud, vendors concentrate on providing existing products like Software as a Service, ignoring changing business and provisioning models of software. Business Intelligence functionality provided in the Cloud is lacking important integration features needed by other Cloud-based applications. While a simple upload of the data to be analyzed into a Cloud-based BI solution is already possible and well established, the visualization of the results and the interactive parts of the analysis are always provided inside the Cloud-based BI solution itself. However, as this chapter shows, common usage scenarios of integrated Cloud applications demand an integration of the analysis reports from BI applications into the user interface of other Cloud-based applications. This chapter describes how a fully integrated Cloud-based BI solution can collaborate with other Cloud-based applications. The technical concept illustrated with an example delineates how the required interface can be provided.*

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## INTRODUCTION

Cloud computing became one of the major IT buzzwords and trends over the last few years, absorbing existing trends and technologies (Gartner, 2012a; Foster, Zhao, Raicu, & Lu, 2008). All of the major IT players such as Microsoft, IBM, Apple, Amazon and Google are providing Cloud-based service offerings for private and commercial customers (Bort, 2012; Presti, 2013). Over the past few years, more and more IT related offerings are being provided over the Internet as paid services. However, there is still a lack of standardization of Cloud services and each vendor uses different technologies, protocols and formats that might lead to lock-in situations for customers. Furthermore, most Cloud vendors are very vague about the internal setup and customer concerns regarding data protection are high (Helmbrecht, 2010; Beckers, Cote, Faßbender, Heisel, & Hofbauer, 2013).

One of the leading software categories in the Cloud is *Business Intelligence* (EMA, 2011). Increasing business challenges make it imperative for enterprises to make good decisions fast. Those decisions are based on large amounts of data collected inside or outside the enterprise over time. The data sources used range from custom spreadsheets using specialized software products to general ERP (Enterprise Resource Planning) products. Business Intelligence solutions are used to aggregate this data and use it as a basis for decision making. They provide ways to extract the data or information, structure and analyze the data, and summarize the results for decision makers. The necessary investments in Business Intelligence solutions are high and it is not surprising that low-cost Cloud offerings in this area became prevalent during the last few years. (EMA, 2011).

The lower financial barrier makes *Cloud-based Business Intelligence* also interesting for small and medium sized businesses, which were not able to afford them before. However, using Business Intelligence in the Cloud brings challenges regarding

security, data protection, and integration. Whereas different authors look at the security and data protection topic intensively (Helmbrecht, 2010; Beckers, Cote, Faßbender, Heisel, & Hofbauer, 2013; Gangadharan & Parrilli, 2011), the specific needs of Cloud-based Business Intelligence are not sufficiently analyzed, especially regarding integration needs as shown in this chapter.

Currently, integration is mostly considered with the question: how does the data that needs to be analyzed get into the BI solution? This chapter focuses on the critical integration topic, but also looks at the integration of a BI solution with other Cloud products. While a simple upload of the data to be analyzed into a Cloud-based BI solution is already possible and well established, the visualization of the results and the interactive parts of the analysis are always provided inside the Cloud-based BI solution itself. However, as we will show, common usage scenarios of integrated Cloud applications demand an integration of the analysis reports themselves into the user interface of other Cloud-based applications.

This chapter starts out with an introduction to Business Intelligence and Cloud computing and then outlines the interaction scenario of an integrated Cloud-based BI solution. Based on this scenario, requirements are identified and needed interfaces are defined. An example interaction scenario based on this model is explained.

## BACKGROUND

To secure the long-term success of an enterprise, one has to anticipate changes and that requires full transparency in terms of the business. This challenge has been present for generations of business leaders to tackle. The massive amount of information and data produced by modern enterprises today counteracts this goal.

Starting in the 80s, IT solutions were developed that were used by management to help create the needed transparency. They got aggregated under

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