

A Novel Architecture and Methodology for Cloud Data Access

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Keywords: Data Migration; Cloud Data Hosting Solutions; Cloud Data Patterns; database layer; Cloud applications; Migration method

1 Introduction

Cloud computing has become increasingly popular with industry due to the clear advantage of reducing capital expenditure and transforming it into operational costs [1]. To take advantage of Cloud computing, an existing application may be moved to the Cloud or designed from the beginning to use Cloud technologies. Applications are typically built using a three layer architecture consisting of a presentation layer, a business logic layer, and a data layer. The data layer is in turn subdivided into the Data Access Layer (DAL) and the Database Layer (DBL). The DAL encapsulates the data access functionality, while the DBL is responsible for data persistence and data manipulation. Figure 1 visualizes the positioning of the various layers.

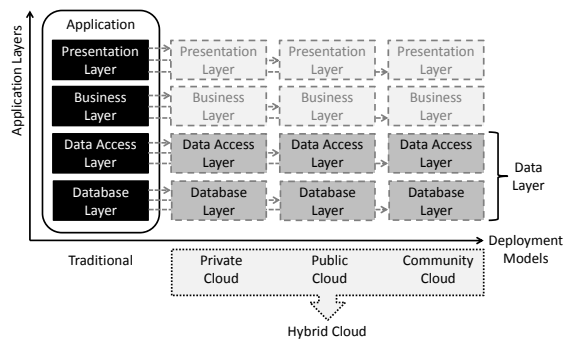


Figure 1. Overview of Cloud Deployment Models and Application Layers

2 Contributions

Each application layer can be hosted using different Cloud deployment models [2]. Figure 1 shows the various possibilities for distributing an application using the different Cloud deployment models.

In this work we focus on the lower two layers of Fig. 1, the DAL and DBL layers of the application. Application data is typically moved to the Cloud because of e. g., Cloud bursting, data analysis or backup and archiving. Using the Cloud technology leads to challenges such as incompatibilities with the database layer previously used or the accidental disclosing of critical data by e. g., moving them to a Public Cloud. To the best of our knowledge and based on literature research there is currently only limited and technology specific support for data migration to the Cloud as well as limited support for transparent access to Cloud data stores.

The contributions of this work are as follows:

1. Taxonomy of Cloud Data Hosting Solutions [4]
2. Catalog and pattern language of Cloud Data Patterns [3]
3. Novel architecture of a data access layer enabling Cloud data access
4. Method for migration of the database layer to the Cloud
5. Prototypical implementations of the concepts including
 - Proof of concept realization of the novel architecture of a data access layer (cf. contribution 3)
 - Proof of concept implementation of tooling support concerning migration of the database layer (cf. contribution 4)

The *taxonomy* classifies various offerings of Cloud data stores of different providers based on specified criteria. A *Cloud Data Pattern* describes a reusable and implementation technology-independent solution for a problem related to the data layer of an application in the Cloud for a specific context. In order to enable transparent access to the Cloud Data Hosting Solutions chosen for migration, this work specifies a *novel architecture of a data access layer* and provides a proof of concept realization. The previous contributions are providing the basis for this research work and will be integrated in the *technology-independent method for the migration of the database layer* into the Cloud, which will include a prototypical implementation for tool support. The main goal of the PhD thesis is to facilitate the migration of existing and newly built applications to the Cloud.

References

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