Universidad Nacional de San Agustín

Base de datos

Spanner: Becoming a SQL System

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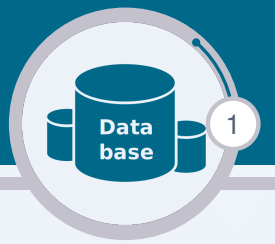
Content



- Spanner
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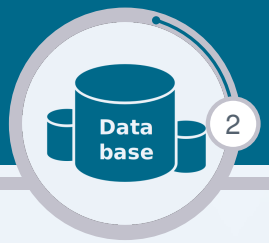
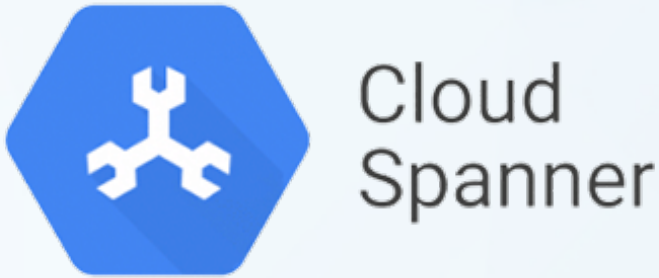
  - Scalability and Disponibility

Spanner
What is spanner?

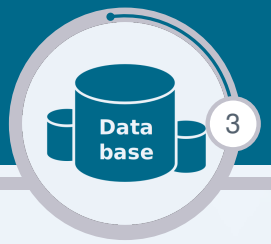


"Spanner is Google's **scalable**, **multiversion**, **globally distributed**, and **synchronously replicated database**" [1].

Spanner is used as an OLTP database management system (for AdWords and Google Play), and is publicly available in Cloud Spanner on the Google Cloud Platform (GCP) [2].



Spanner
What is spanner?



	Spanner	Traditional relational	Traditional non-relational
Scheme	yes	yes	no
SQL	yes	yes	no
Consistency	strong	strong	eventual
Availavility	high	Failover	High
Scalability	Horizontal	Vertical	Horizontal
Replication	Automatic	Configurable	Configurable

Table: Properties of Spanner. Source: Cloud spanner

Architecture
Horizontal partition

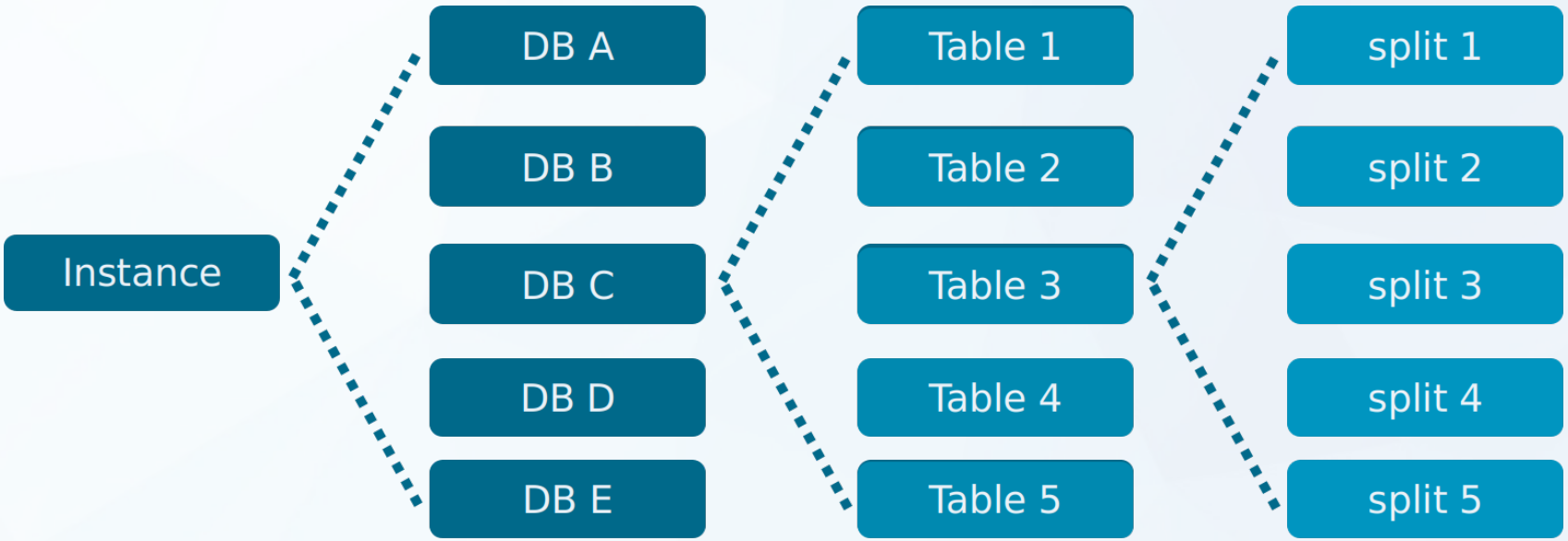


Figure: Example of horizontal partition.

Architecture
Sharded, geo-replicated relational database

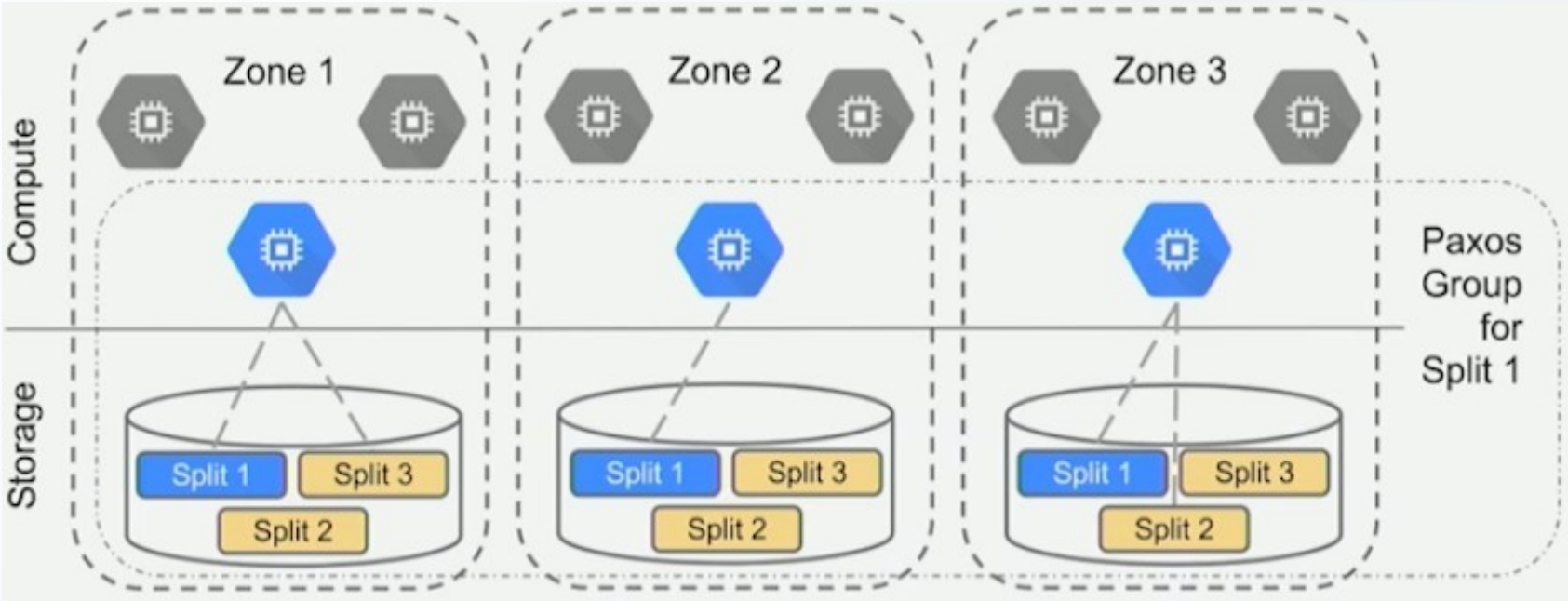


Figure: Spanner is a sharded, geo-replicated relational database. It uses a replicated write-ahead redo log, and the Paxos protocol.

Architecture
Consistent read

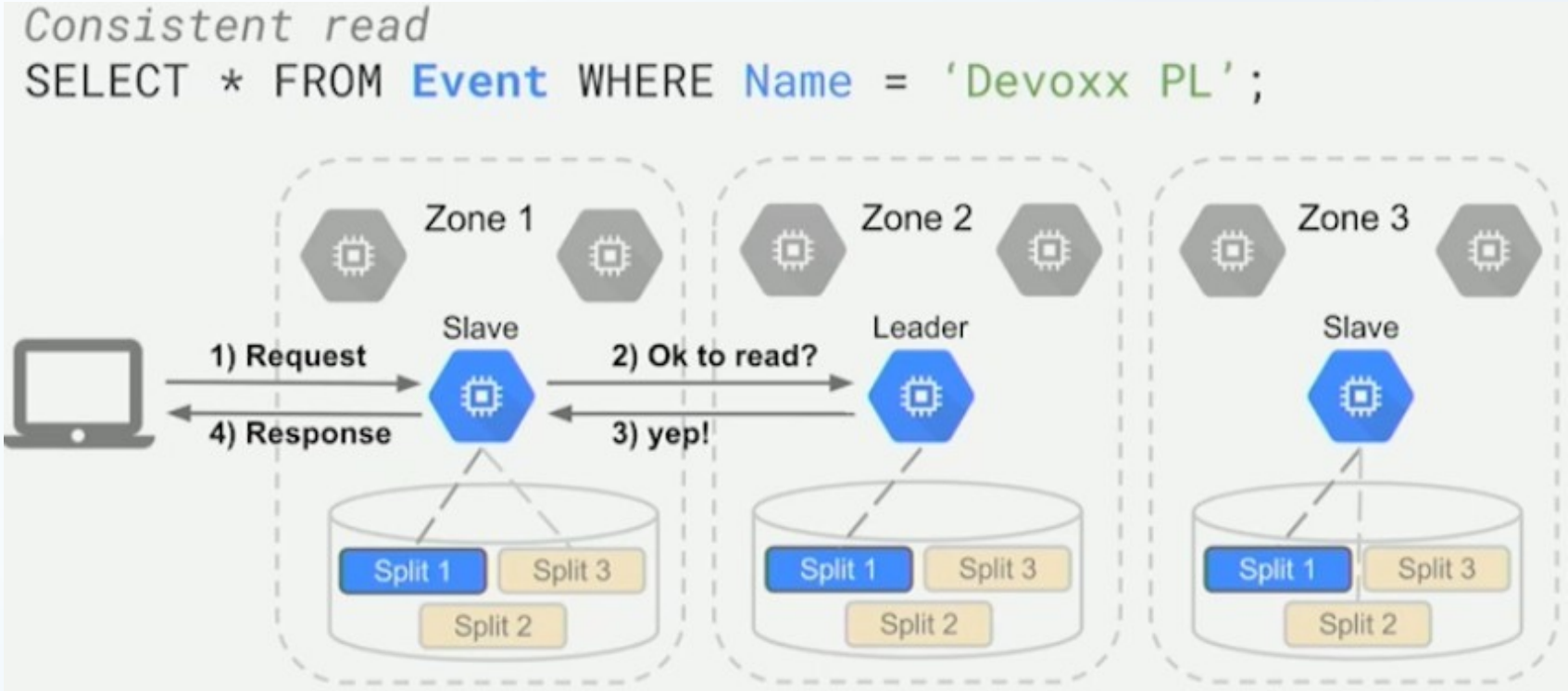


Figure: Slave is updated.

Architecture
Consistent read

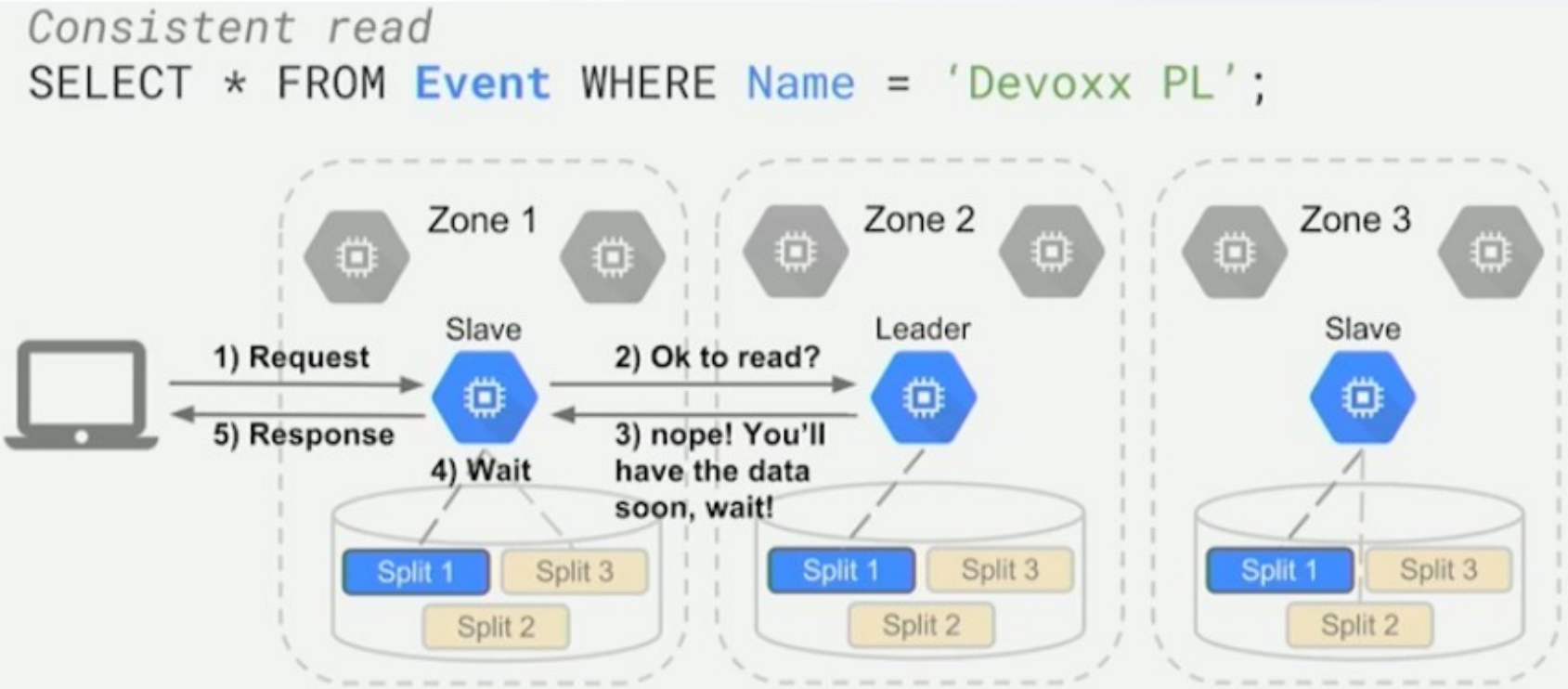


Figure: Slave is not updated.

Architecture
Consistent read

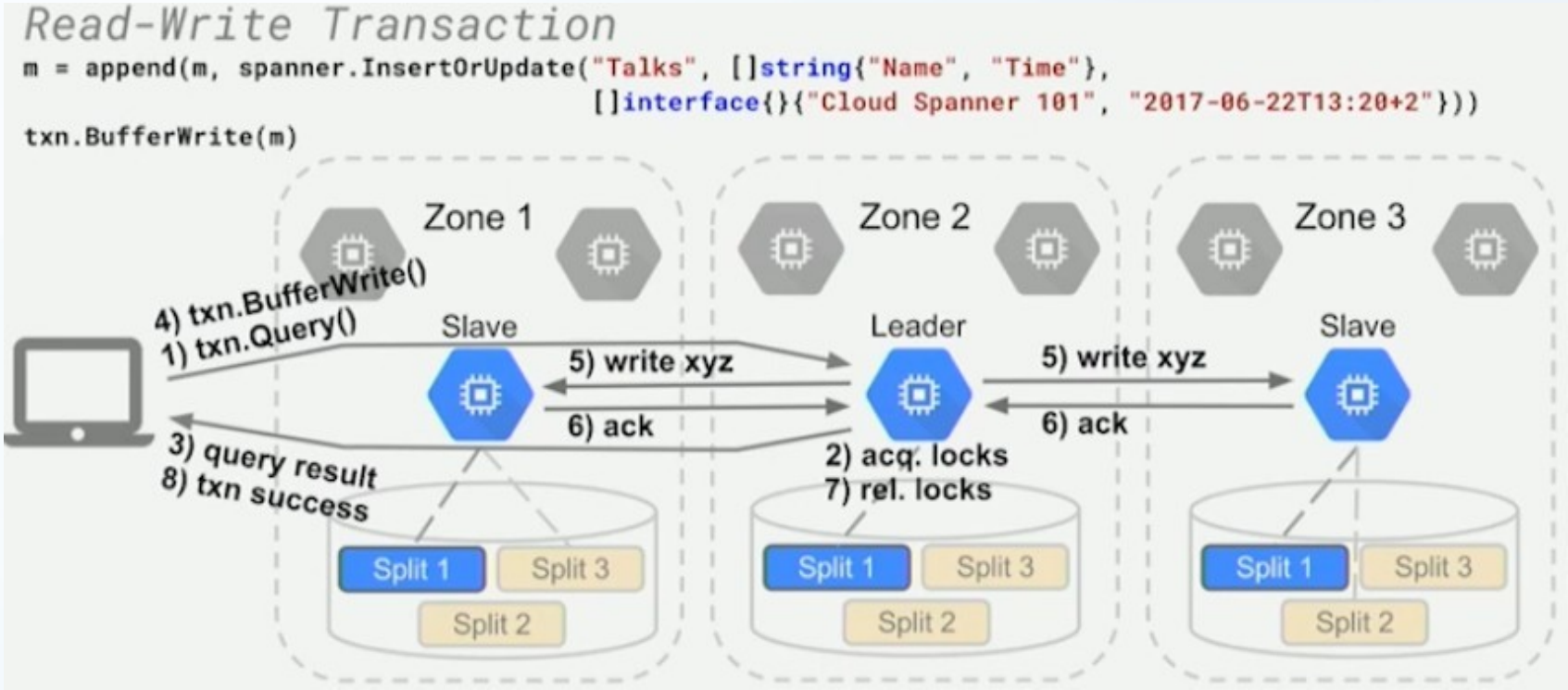
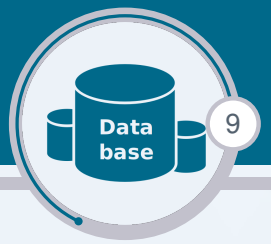


Figure: Read-write transaction.

Scalability and Disponibility



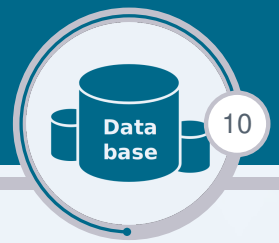
Why Spanner is scalable?

Spanner follows a range sharding architecture, so it reduce disk space and memory use.

What technologies support Spanner's disponibility?

Truetime [3], automatic replication.

References I



[1] J. C. Corbett, J. Dean, M. Epstein, A. Fikes, C. Frost, J. J. Furman, S. Ghemawat, A. Gubarev, C. Heiser, P. Hochschild *et al.*, "Spanner: Google's globally distributed database," *ACM Transactions on Computer Systems (TOCS)*, vol. 31, no. 3, pp. 1–22, 2013.

[2] D. F. Bacon, N. Bales, N. Bruno, B. F. Cooper, A. Dickinson, A. Fikes, C. Fraser, A. Gubarev, M. Joshi, E. Kogan *et al.*, "Spanner: Becoming a sql system," in *Proceedings of the 2017 ACM International Conference on Management of Data*, 2017, pp. 331–343.

[3] E. Brewer, "Spanner, truetime and the cap theorem," 2017.