Data Lakes

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Data lake

- Data repository for
  - Original data in ***raw*** format
  - Transformed data used for various types of reporting
- Data formats
  - Structured data (e.g., relational data)
  - Semi-structured data (e.g., CSV, JSON, XML)
  - Unstructured data (e.g., text documents, emails)
  - Binary data (e.g., images, audio files)
- Query more similar to a google search (+ data wrangling)

Why data lakes?

- Often not all questions data can answer are known a-priori
  - hard to store data in some «optimal» form
- An attempt to break down information silos
  - Information not adequately shared among data systems
- Based on exploiting massive, cheap data storage

Data lakes characteristics

- Data lakes store all data
  - DW design requires deciding what data to include (and to not include) in the warehouse
  - Data lakes include also data that might be used “someday”
- Data lakes manage all data types
- Data lakes provide service to all users
  - Users process a variety of different types of data and answer new questions
- Data lakes adapt easily to changes
  - All data is stored in its raw form and is always accessible
  - Users are empowered to explore data in novel ways
- Data lakes provide faster insight
  - … but early access to the data comes at a price

Data warehouse

- Relational data coming from transactional systems, operational databases, and line of business applications
- Schema designed prior to DW implementation (schema-on-write)
- High cost storage
- Data quality: highly curated data that serves as the central version of the truth
- Users are business analysts
- Analytics: BI and visualization, batch reporting

Data lake

- Data is both non-relational and relational, coming from IoT devices, web sites, mobile apps, social media, and corporate applications
- Schema is written at the time of analysis (schema-on-read)
- Low-cost storage
- Data quality: Any data that may or may not be curated (ie. raw data)
- Users are data scientists, data developers
  - business analysts, if using curated data
- Analytics: full-text search, machine learning, predictive analytics, data discovery and profiling

Pros of data lakes

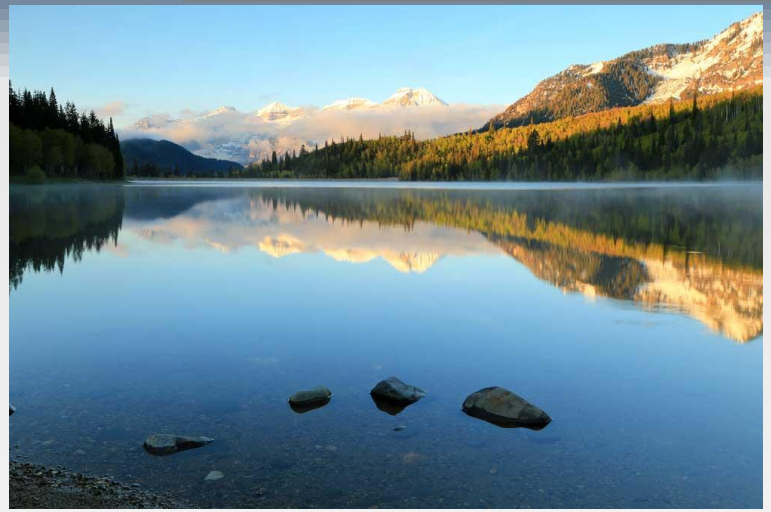
- Ability to harness more data, from more sources, in less time
- Data structures and business requirements are defined only when needed
- Empowering users to collaborate and analyze data in different ways
  - self service analytics
- Integration happens outside the storage environment
- Minimal involvement of IT
  - Wrangling with data is a self-service function
- Sandboxes for self-service analytics
  - Need well defined problems

Cons of data lakes

- Raw data is stored with no oversight of the contents
  - Storing data does not, on its own, provide business value
  - Need data governance, semantic consistency, mechanism to catalog data
- Consistency and data quality are uncertain
  - Data brought into a data lake is co-located not integrated
- Business users don't have time/willingness to learn
  - How can they wrangle with raw data?
- Rogue queries can bring down big clusters

The central question is whether collecting and storing data without a pre-defined business purpose is a good idea

From data lakes…



… to data swamps

- massive repositories of data that are completely inaccessible to end users
  - data collected without any clear way to get value from it
- risk to be abandoned (budget cut)

To avoid drowning in your data lake

- Collect less data, at least in the beginning