Enterprise Simulations

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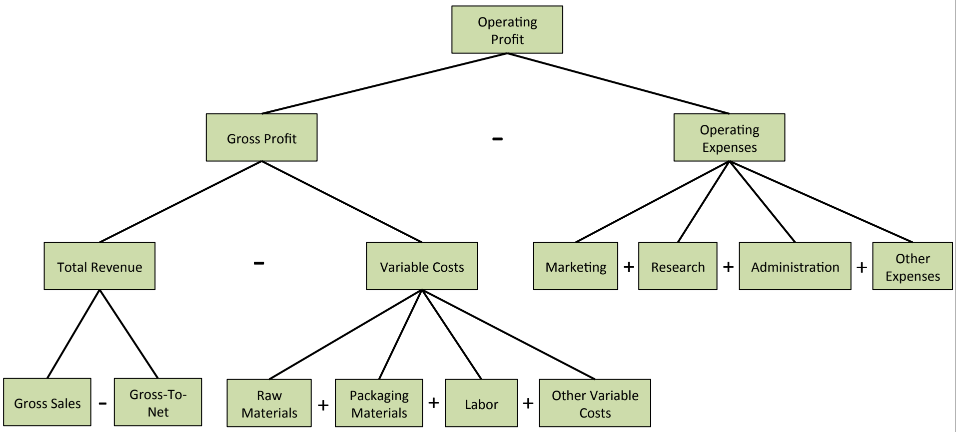
Motivation

- Companies want to anticipate changes and understand sensitivity, but they are missing the right models and tools.

- Questions a CEO may ask
  - How does a commodity price increase will effect my company's P&L statement?
  - How does a country's inflation and currency devaluation will influence the global P&L statement?

How KPIs are composed: Value Driver Trees



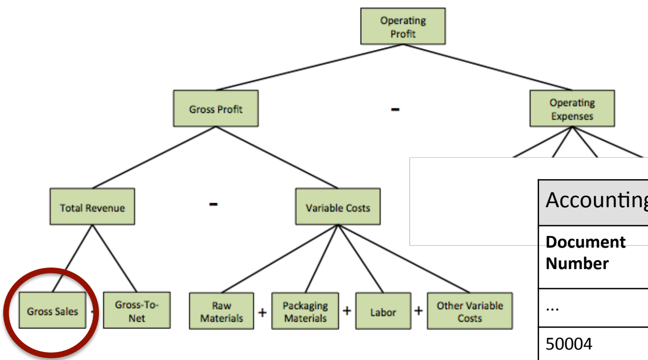
Simulation Parameters

- External (economic, political, ...) parameters
  - Currency exchange rates
  - Inflation
  - Taxes
  - Minimum wage regulations
  - ...
- Internal (company-specific) parameters
  - Labor/production costs
  - Commodity prices
  - Travel expenses
  - ...

Challenges

- Mapping of value drivers to relational schema
  - Each value driver is based on different tables and attributes
  - Multiple queries are necessary to get all drivers
- Getting the data efficiently
  - Flexible real-time simulations require access to raw data
  - Working on materialized aggregates limits flexibility and does not ensure data freshness (consistency)

Leveraging Columnar Databases and the Aggregate Cache

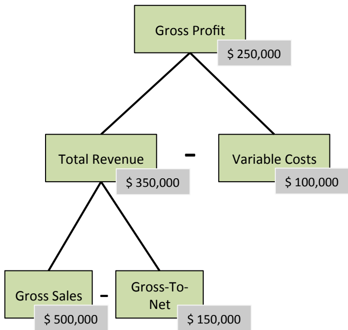


Accounting Document Segments

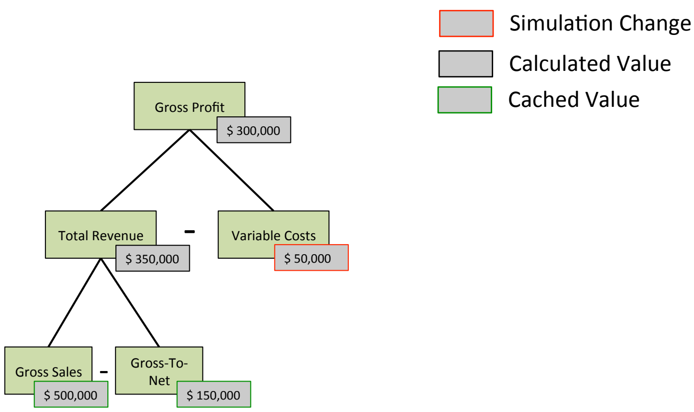
Document Number	...	G/L Account	...	Amount
...		...		...
50004		Gross Sales		$ 877.26
50005		Year – End Bonuses		$ 519.11
50006		Gross Sales		$ 1645.95
...		...		...

Leveraging Columnar Databases and the Aggregate Cache

- Idea
  - Transparent aggregate caching of value drivers
  - Develop view matching algorithms to reuse aggregates

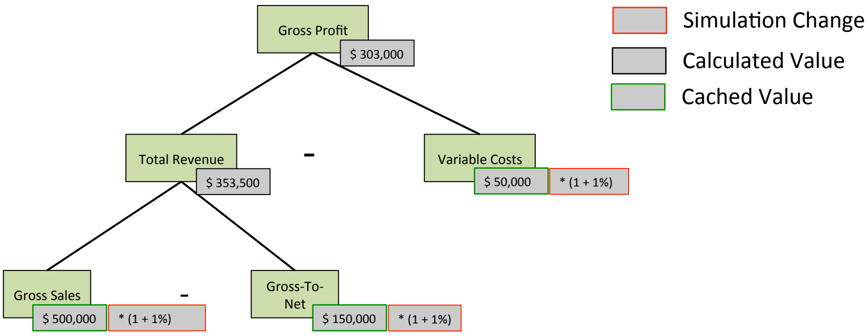


Simulation Parameter: Fixed Variable Costs

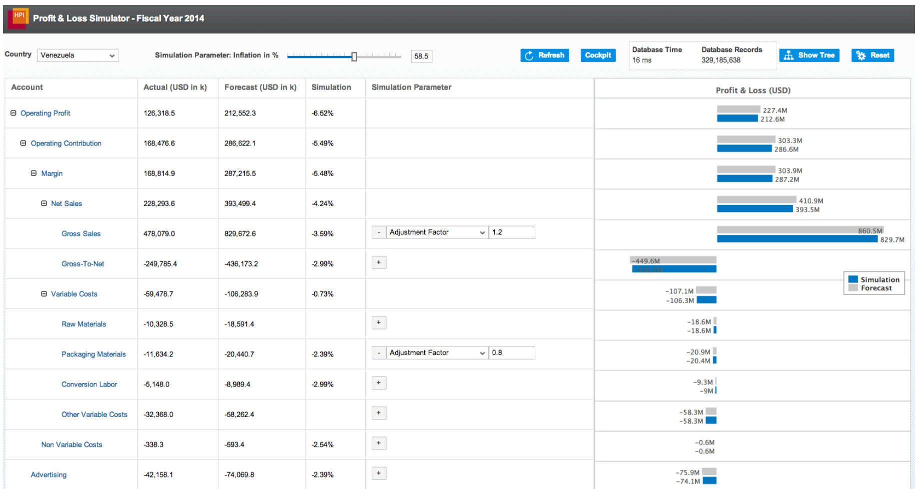


Simulation Parameter: Inflation Change

- Inflation ratio increase of 1%



Demo: Profit & Loss Simulation



Profit & Loss Simulator - Fiscal Year 2014

Country: Venezuela | Simulation Parameter: Inflation in % 58.5 | Refresh | Cockpit | Database Time 16 ms | Database Records 329,185,638 | Show Tree | Reset

Account	Actual (USD in k)	Forecast (USD in k)	Simulation	Simulation Parameter	Profit & Loss (USD)
⊟ Operating Profit	126,318.5	212,552.3	-6.52%		227.4M / 212.6M
⊟ Operating Contribution	168,476.6	286,622.1	-5.49%		303.3M / 286.6M
⊟ Margin	168,814.9	287,215.5	-5.48%		303.9M / 287.2M
⊟ Net Sales	228,293.6	393,499.4	-4.24%		410.9M / 393.5M
Gross Sales	478,079.0	829,672.6	-3.59%	- Adjustment Factor 1.2	860.5M / 829.7M
Gross-To-Net	-249,785.4	-436,173.2	-2.99%	+	-449.6M / -436.2M
⊟ Variable Costs	-59,478.7	-106,283.9	-0.73%		-107.1M / -106.3M
Raw Materials	-10,328.5	-18,591.4		+	-18.6M / -18.6M
Packaging Materials	-11,634.2	-20,440.7	-2.39%	- Adjustment Factor 0.8	-20.9M / -20.4M
Conversion Labor	-5,148.0	-8,989.4	-2.99%	+	-9.3M / -9M
Other Variable Costs	-32,368.0	-58,262.4		+	-58.3M / -58.3M
Non Variable Costs	-338.3	-593.4	-2.54%	+	-0.6M / -0.6M
Advertising	-42,158.1	-74,069.8	-2.39%	+	-75.9M / -74.1M

Simulation / Forecast