Journey to the Cloud: Building an Analytics program with Snowflake & Tableau

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Brown Advisory
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Brown Advisory
13+ years experience with Data & Financial Technology
Support & Development for entire lifecycle of Financial Service Technology

I ❤ DATA

Brown Advisory
Legg Mason

Management & Leadership
Information Systems
Computer Science

TABLEAU CONFERENCE

MIT
UMBC
JMU
Rate of Change

Average company lifespan on S&P 500 Index (in years)

Year (each data point represents a rolling 7-year average of average lifespan)

DATA: INNOSIGHT/Richard N. Foster/Standard & Poor’s
Agenda

- Introduction To Brown Advisory
- Data Warehouse Journey
- About Snowflake
- Snowflake & Tableau
- Demo
Thoughtful, Long-Term Investment Solutions.

Brown Advisory helps individuals, families and institutions invest their capital, tackle complex challenges and pursue ambitious, long-term goals.
WHO WE ARE

$75+ billion
Total client assets as of September 30, 2019.

650+ colleagues
Colleagues work alongside each other in support of Brown Advisory’s client-focused mission.

1998
The year Brown Advisory became a private and independent firm, via a buyout led by management and investment teams.

Global Perspective, Local Presence
Offices in the United States, Europe and Asia give us a diverse perspective for building comprehensive solutions.

97% retention
Average annual percentage of clients we have retained over the past 10 years, as of December 31, 2018.
Core Tenents of Digital Transformation

Make it Easy

Build the highway

Buy vs Build

Best in Class

Cloud First

Data is new Oil
The Problem / Need

Build enterprise data warehouse to harness our organizations data and drive value for the business.
Traditional Warehouse Challenges

- **Complexity**: Manage both infrastructure and data
- **Limited Scalability**: Can’t support all data, users and workloads
- **Inadequate Elasticity**: Stuck with rigid, inflexible architectures
- **Rigid Cost**: Forced to keep the lights on 24/7
- **Diversity**: Unable to consolidate siloed datasets
Why Data in the Cloud?

1. Instantly scale up/down based on need
2. Not limited by storage or compute
3. Communicate cost of data
4. Data Warehouse as a service
5. Enable a new generation of insights
WHAT IS SNOWFLAKE?

SQL Data Warehouse
Built for the cloud
Delivered as a service
Road Map for Data Warehouse

• Define Business Objectives/Requirements
• Start with data discovery
• Define your use case
• Product evaluation and selection
• Set-up environment
• Data modeling
• Choose ETL/ELT Solution
• Connect to analytics
# Data Inventory

## Data Governance & Management

### Analytics & Visualization (Tableau)

## Brown Advisory Data Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advice</td>
<td>5 SD</td>
</tr>
<tr>
<td>Client Profiles</td>
<td>19 SD</td>
</tr>
<tr>
<td>Corporate Governance</td>
<td>1 SD</td>
</tr>
<tr>
<td>Market / Prices</td>
<td>6 SD</td>
</tr>
<tr>
<td>Performance / Benchmark</td>
<td>6 SD</td>
</tr>
<tr>
<td>Rules / Restrictions</td>
<td>4 SD</td>
</tr>
<tr>
<td>Technology</td>
<td>14 SD</td>
</tr>
<tr>
<td>Business Dev.</td>
<td>5 SD</td>
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<tr>
<td>Colleague Profiles</td>
<td>17 SD</td>
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<tr>
<td>Documents</td>
<td>4 SD</td>
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<tr>
<td>Messaging</td>
<td>8 SD</td>
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<tr>
<td>Portfolio Accounting</td>
<td>8 SD</td>
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<tr>
<td>Securities Reference</td>
<td>9 SD</td>
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<tr>
<td>Trading &amp; Settlements</td>
<td>10 SD</td>
</tr>
<tr>
<td>Cash &amp; Collateral</td>
<td>6 SD</td>
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<tr>
<td>Corporate Accounting</td>
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<td>Facilities</td>
<td>3 SD</td>
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<tr>
<td>Notes</td>
<td>2 SD</td>
</tr>
<tr>
<td>Portfolio Attributes</td>
<td>3 SD</td>
</tr>
<tr>
<td>Tasks</td>
<td>2 SD</td>
</tr>
<tr>
<td>Client Expenses / Fees</td>
<td>3 SD</td>
</tr>
<tr>
<td>Corporate Actions</td>
<td>3 SD</td>
</tr>
<tr>
<td>Legal / Compliance / IA</td>
<td>23 SD</td>
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<tr>
<td>Operational Reference</td>
<td>7 SD</td>
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<tr>
<td>Research</td>
<td>5 SD</td>
</tr>
<tr>
<td>Tax</td>
<td>10 SD</td>
</tr>
</tbody>
</table>
Data Warehouse Current State

Data Types
- 15-20 Major Financial Service and Enterprise applications
- On-Prem & Cloud Applications
- Mostly Structured data; some unstructured
- 4 - 6 TB of data

Current Reporting
- Silo’d Reporting in transaction systems (SQL)
- Tableau, SSRS, ad-hoc queries, excel, pointed directly at transitional system.

Data Warehouse Initiatives
- ETL process from accounting system to data marts for client web portal

ETL
- Client Web Portal Data mart – Pentaho
- Application Integration – Informatica, SSIS, command-line point-to-point integration
Data Warehouse Goals

Moving Data Analytics to the Cloud
- Focus on Data no infrastructure
- Scalability

Modernize Data Platform
- Replace legacy Data Warehouse applications
- Data Consolidation

Build Analytics Capabilities
- Offer insights to Business
- Data driven organization
Cloud Data Warehouse Evaluation Criteria

- Data Types & Integration
- Performance & Scalability
- Availability & Reliability
- Security
- Maintenance
- Total Cost of Ownership

Does the tool work for what you plan to do?
Modern Data Landscape
SNOWFLAKE ARCHITECTURE
Additional Snowflake Features

- **Query Caching:** Instant results for executive dashboard and commonly run reports.
- **Cloning:** Instant dev/test environments or point of time snapshot.
- **Time Travel:** Query data as of any point in time within the past 90 days.
- **Upgrades:** Weekly system updates with zero downtime.
- **Security:** Encryption by default.
- **Data Sharing:** Publish or consume data sets to or from external partners.
- **Json Ingest:** Ingest raw JSON without transformation.
Snowflake/Tableau Demo

https://aga43396.us-east-1.snowflakecomputing.com/
Myth: Data is only for trained analysts/data science

- Data is exploding
- 800 M knowledge workers could be using analytics as a part of their job

Data Warehouse & Analytics as a cloud service

- No hardware (virtual or physical) for you to select, install, configure or manage.

Tableau & Snowflake
Tableau Connecting to Snowflake

Connecting to Snowflake in Tableau:

1. Open a new connection in Tableau.
2. Select "To a Server" from the "Connect" menu.
3. From the list, choose "Snowflake" and click "Next".
4. Enter the Snowflake server URL: "tableau.snowflakecomputing.com".
5. Set the role to "Optional" if needed.
6. Enter your username and password.
7. Click "OK" to connect.

Tableau will now connect to Snowflake.
Tableau Snowflake Tables
Pay for what you use

**Compute Cost Overview**

*Use this dashboard to identify trends in your compute habits. Drill down on individual sheets to check for opportunities to limit costs.*

<table>
<thead>
<tr>
<th></th>
<th>This Month</th>
<th>Avg Spend By Today</th>
<th>Last Month</th>
<th>Monthly Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$1,290</td>
<td>$685</td>
<td>$1,643</td>
<td>$715</td>
</tr>
</tbody>
</table>

**Cost Per Warehouse**

*Select a Warehouse to drill down*

- CTL Warehouse: $4,706.64
- P Warehouse: $3,982.89

**Cost By Day Of Week And Time**

*Check for days/times when resources are used infrequently and limit Compute Nodes during "slow times."

*Last Updated: 5/20/2019 4:00:00 PM*
Forecast Cost

Compute Credit Forecasting
This dashboard uses historic credit usage to forecast remaining contract length. Instruction below.

1. Input your contract information
   - Contract Start: 5/1/2018
   - Credits Purchased: 400
   - Cost per Credit: $25.00

2. The forecast is calculated using your average historic credit consumption. Input the number of Previous Days you'd like to include in calculating your Average Daily Credit Usage.
   - Previous Days to Include: 14
   - Avg Daily Credit Usage: 2.189
   - Forecasted End Date: January 16, 2020

- $6,219 Spent
  - $3,781 Remaining
- 249 Credits Used
  - 151 Credits Remaining
- 69 Days to Renewal
  - 38% of Credits Left

Cumulative Usage
- Credits Purchased: 400

Daily Usage
- Last Updated: 11/8/2019 9:00:00 PM
Adoption

User Adoption

Drill down into Databases, Schemas and Query Types to track adoption across your organization.

<table>
<thead>
<tr>
<th>Total Queries</th>
<th>Total Users</th>
<th>Queries Per User</th>
<th>Time Per Query (ms)</th>
<th>Error Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>71,741</td>
<td>32</td>
<td>2,241.9</td>
<td>1,100</td>
<td>14.2%</td>
</tr>
</tbody>
</table>

Queries per Warehouse Size

- X-Large: 25.91%
- Large: 65.27%
- Small: 6.31%
- X-Small: 2.51%
- Null: 0%

Users and Usage over Time

- Number of Users over time: July 2018 to May 2019
  - Number of users: 0, 5, 10, 15, 20, 25

Users Per Warehouse (Hover for list of users)

Select a Warehouse to drill down

Users Per Database (Hover for list of users)

Select a Database to drill down

Last Updated: 5/20/2019 4:34:00 PM
## Performance Monitoring

Select the Time Metric you’d like to analyze. Then drill down to see which Databases are meeting your performance needs. Explore if their workloads justify a change in Warehouse size.

### Total Queries
- **71,741**

### Avg Performance
- **1,100 ms**

### Queries Using CSL
- **46,828**

### CSL Util. Rate
- **65.27%**

### Avg. Total Elapsed Time per Warehouse
- **<appropriate table/chart data>**

### Avg. Total Elapsed Time per Byte Scanned
- **<appropriate table/chart data>**
Server Admin Dashboards
Server Admin Dashboards
Server Admin Dashboards
Server Admin Dashboards
Recap: Best Practices

• Define use case
• Define your evaluation criteria
• Make use of the Free Trial
• Make use of Snowflake Resources
• Make use of Tableau Resources
  • https://www.tableau.com/solutions/snowflake
Thank You
Please complete the session survey in the mobile app

View ‘My Evaluations’ in the menu or find your session under ‘Schedule’
TABLEAU CONFERENCE