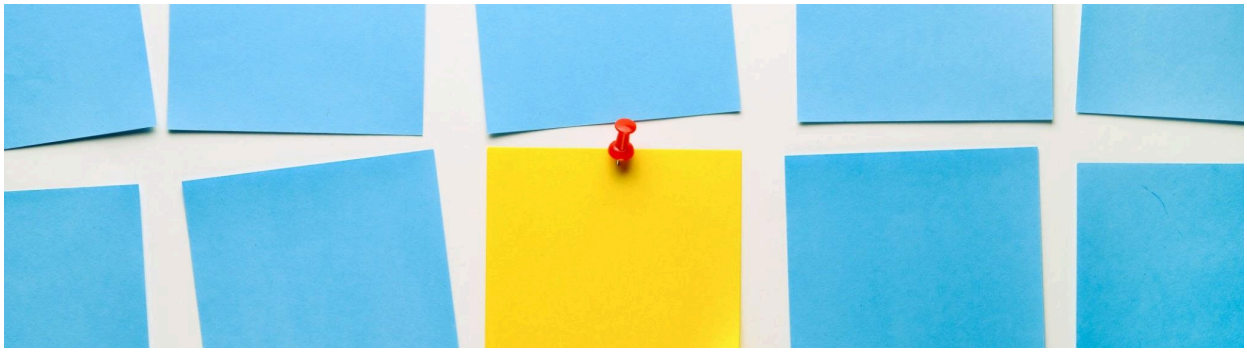

End-to-End Analytics with Snowflake and Power BI

Overview

This project demonstrates how to transform raw data into an optimized format for analysis in Power BI. The workflow includes:

1. Data Profiling – Examining raw data using Snowsight.
2. Access Management – Creating roles and granting privileges for a global BI Analyst team.
3. Data Enrichment – Integrating third-party location data from the Snowflake Marketplace.
4. Data Transformation – Structuring raw data into a model suitable for downstream analysis.
5. Data Security – Implementing column- and row-level data protections.

6. Power BI Integration – Connecting a provided .pbit template to the Snowflake data model for live analysis of sales transactions.

This process ensures data is secure, enriched, and ready for insightful visualization in Power BI.

Prerequisites

- Completion of An Introduction to Tasty Bytes quickstart (provides dataset and initial virtual warehouses).
- Familiarity with Snowflake.
- Experience with Power BI.

Learning Outcomes

- Profile data using Snowsight.
- Enrich organizational data with third-party datasets from the Snowflake Marketplace.
- Understand star schema design and its benefits.
- Build simple ELT pipelines with SQL using Dynamic Tables.
- Apply data governance using Snowflake Horizon (tagging, masking, protections).
- Connect Power BI to Snowflake for near-real-time analytics.

Requirements

- Snowflake Account (30-day free trial available).
- Power BI Desktop.
- Provided Power BI Template File.
- Optional: Access to a Power BI Service Workspace.

Deliverables / What You’ll Build

- Data engineering pipelines using declarative SQL and Dynamic Tables.
- Star schema with protections via Snowflake Horizon features (masking policies).
- Power BI DirectQuery semantic model optimized for performance and near real-time analytics without manual refreshes.

First, it is important to learn about Tasty Bites. So moving forward with this:

Overview

This Quickstart introduces the Tasty Bytes fictitious food truck brand created by Snowflake. It guides you through setting up the foundational data model, workload-specific roles and warehouses, and all necessary Role-Based Access Control (RBAC). Completing this Quickstart prepares you to run further Powered by Tasty Bytes Quickstarts.

Prerequisites

- A supported Snowflake browser.
- Enterprise or Business Critical Snowflake Account (or free 30-day trial; choose Enterprise edition).
- Access to your Snowflake Account URL via the activation email.

Learning Outcomes

- Create and use a Snowflake Worksheet.
- Execute queries synchronously within a worksheet.
- Explore databases, schemas, tables, roles, and warehouses via SQL.

Deliverables / What You'll Build

Tasty Bytes Foundation for running subsequent Quickstarts.

- Snowflake Database with:
- Raw, Harmonized, and Analytic Schemas
- Tables and Views
- Workload-specific roles and warehouses
- Fully implemented Role-Based Access Control (RBAC)

Setting up Tasty Bytes

Overview:
This Quickstart uses **Snowsight**, Snowflake's web interface, to set up the Tasty Bytes foundational environment. For first-time users, reviewing the Snowsight Documentation is recommended.

Steps:

1. **Access Snowflake** – Open your browser and enter your Snowflake Account URL.
2. **Login** – Enter credentials to log into Snowflake.
3. **Navigate to Worksheets** – Click **Projects** → **Worksheets** in the left-hand menu.
4. **Create a Worksheet** – Click the "+" button in Snowsight.
5. **Rename Worksheet** – Name it: `"Tasty Bytes - Introduction"`.
6. **Access Setup SQL** – Open the hosted Tasty Bytes SQL file on GitHub.
7. **Copy SQL** – Click "Copy raw contents" in GitHub.
8. **Paste SQL** – Paste the copied SQL into your Snowsight worksheet.
9. **Run SQL** – Click **Run All** to execute all queries synchronously.
10. **Complete Setup** – Queries execute in sequence (~3 minutes). A completion message `tb_101 setup is now complete` confirms success.

Outcome:
The Snowflake environment for Tasty Bytes is fully set up, including databases, schemas, tables, roles, and warehouses, ready for subsequent Quickstarts and analysis.

Exploring the Tasty Bytes Foundation

Overview:
After completing the Tasty Bytes setup, we can now explore the database, schemas, tables, roles, and warehouses that were created.

Steps:

1. Check the database
   Use the SYSADMIN role to confirm that the database `tb_101` exists.

2. Check schemas
   List all schemas inside the `tb_101` database.

3. Check tables in the RAW_POS schema
   View the tables available in the `raw_pos` schema.

4. Check roles
   Show all roles that were created for the Tasty Bytes project.

5. Check warehouses
   View all warehouses created for Tasty Bytes.

6. Query data with role and warehouse
   Switch to the role `tb_data_engineer` and the warehouse `tb_de_wh`, then run a query on the `raw_pos.menu` table to see which menu items are sold at the Plant Palace food trucks.

Outcome:
The Tasty Bytes demo environment is now ready with data, roles, and warehouses. You can use this foundation to continue with other Tasty Bytes Quickstarts.

Third Party Data from Snowflake Marketplace

Overview
In this section, we enrich the Tasty Bytes dataset with external data from the Snowflake Marketplace. This shows how quickly third-party datasets can be integrated without building custom APIs or pipelines.

Snowflake Marketplace
The Snowflake Marketplace lets users:

- Discover and test third-party datasets
- Access raw data instantly, with continuous updates
- Combine external datasets with internal data for new insights
- Avoid building and maintaining APIs or pipelines
- Use BI tools such as Power BI directly

Use Case: Location Data
The Tasty Bytes dataset contains sales locations but lacks details like addresses, postal codes, and coordinates. We use the free **SafeGraph: Frostbyte** dataset from the Marketplace to fill these gaps.

Steps:

1. Access the Marketplace from the Snowflake navigation menu.
2. Search for **"SafeGraph: Frostbyte"**.
3. Review the listing and click **Get**.
    - Database name: *SafeGraph_Frostbyte* (default)
    - Grant access to roles: *TB_DATA_ENGINEER*, *TB_DEV*
4. Click **Done** to add the dataset.
5. Create a new worksheet called *"2 - Marketplace Data"*.
6. Query and explore the shared dataset.

7. Perform a cross-database join with the Tasty Bytes `location` table using the `placekey` field.

8. Create a copy of the SafeGraph data in the `raw_pos` schema for later use.

Outcome
By joining SafeGraph with Tasty Bytes data, we successfully enriched the dataset with additional location details. This demonstrates how Snowflake Marketplace can quickly enhance organizational data with zero ETL effort.

Transforming Data with Dynamic Tables

Star Schemas

Star schemas are built from **fact tables** (business processes like sales, inventory) and **dimension tables** (context like customer, product, date).

- Benefits for Power BI:
    - Easy for business users to navigate
    - Supports multiple business processes
    - Simple relationships = better performance
    - Cleaner DAX, faster filters/slicers

Dynamic Tables

- Special Snowflake tables that store results of SQL logic with scheduled refreshes.
- Look like regular tables but auto-refresh like pipelines.
- Benefits:
    - Snowflake handles orchestration & scheduling
    - Incremental refresh for performance

- Full observability in Snowsight
- Can chain multiple Dynamic Tables together

Steps to Build Tasty Bytes Star Schema

1. Create static **Date** and **Time** dimensions (one-time load).
2. Build **Dynamic Tables** for:
    - Trucks, Franchises, Menu Items, Locations, Customers
    - Fact tables for orders (detail, header, aggregates)
3. Refresh frequency set (e.g., every hour) to keep data fresh for Power BI.

Outcome
We now have a **clean star schema** in Snowflake, refreshed automatically via Dynamic Tables. This ensures Power BI can deliver fast, intuitive, and self-service analytics.

Protecting Sensitive Data with Snowflake Horizon

Snowflake Horizon provides governance features to secure and control access to sensitive data. In this guide, we applied three main techniques:

1. Tagging & Classification

System Tags: Snowflake automatically classifies data columns (e.g., name, email, DOB) with semantic and privacy categories.

Custom Tags: We created custom tags (e.g., pii_name_tag, pii_email_tag) and assigned them to sensitive columns in the Customer dimension.

2. Masking Policies

Implemented dynamic data masking to hide sensitive values at query time.

Created reusable policies for names, phone numbers, emails, and DOBs.

Linked policies to tags → any tagged column is automatically masked for non-privileged roles.

3. Row Access Policies

Built a mapping table to link roles to specific location IDs.

Created a row access policy that enforces role-based filtering at query time.

Applied this policy to fact tables so users only see rows they are authorized for.

✅ Outcome

Global/admin roles see full data.

Regional analyst roles see only their assigned data.

Sensitive fields (names, emails, phone numbers, DOB) are masked for non-privileged users.

This ensures sensitive data is protected while still enabling secure analytics in Power BI.

Conclusion and Resources

End-to-End Analytics with Snowflake and Power BI

What You Learned

- How to easily profile data with Snowsight
- How to enrich your organizational data with third party datasets from the Snowflake Marketplace
- Why star schemas are important, specifically when using Power BI

- How to build simple ELT pipelines with SQL using Dynamic Tables
- How to tag and protect your data with Snowflake Horizon's governance features
- Connecting Power BI to Snowflake to perform near-real time analytics against large data volumes

Related Resources and Quickstarts

- Snowflake and Power BI: Best Practices and Recent Improvements (Blog)
- Exploring Snowflake Data Governance with Power BI (Blog)
- Understand Star Schema and the Importance for Power BI (Microsoft Documentation)
- Getting Started with Snowflake Dynamic Tables (Snowflake Quickstart)
- Tasty Bytes - Zero to Snowflake - Collaboration (Snowflake Quickstart)
- Tasty Bytes - Zero to Snowflake - Governance with Snowflake Horizon (Snowflake Quickstart)
- Getting Started with Horizon for Data Governance in Snowflake (Snowflake Quickstart)