MNT

SMART ANALYTICS
DATA LAYER INTRODUCTION

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Make ideas real

AGENDA

► Introduction (~45 min)

  – The SmartAnalytics database structure

    – The 2 databases of SmartAnalytics

    – The 3 basic table types that cover everything

    – Where to find the right data for your queries

    – Benefits of the extra data processing

  – SA Demo – Drill down and filtering

  – Custom extensions to the extending the data structure and how to make more out of it by finalizing the customization in the SA UI.

  – Less familiar features of the SA data structure and application
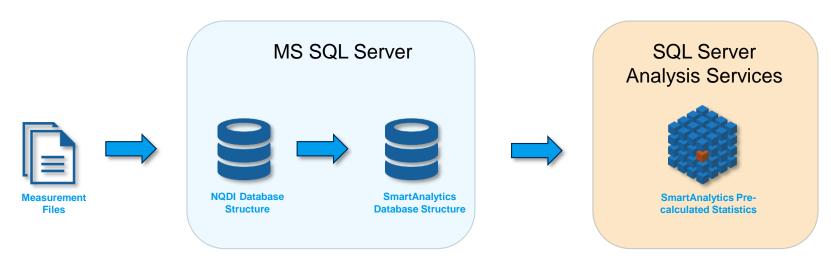
► Q&A (15-30 min)

DATABASE STRUCTURE

► In fact, SmartAnalytics requires 2 different databases at the same time

- A relational SQL database
  - For storing the raw data we import from the files
  - MS SQL Server supported only
- A multidimensional OLAP cube database
  - For automatic aggregation of abundant and fast statistics
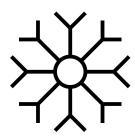 - Commonly this is also referred to as a *Data Warehouse*

DATABASE STRUCTURE

► Of course, this adds more complexity to the data ingestion:

► SmartAnalytics is able to provide statistical results on the UI very quickly, almost independently from the amount of data imported.

► This is achieved using SSAS multi-dimensional cubes which are basically a specialized database for pre-calculated statistical result.
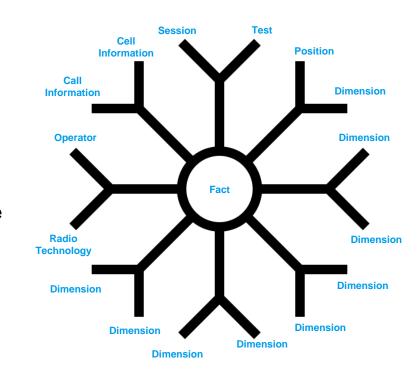
DATABASE STRUCTURE

► The SQL database is a mere superset of the NQDI Classic database structure
  – Every SmartAnalytics database can also be accessed from NQDI
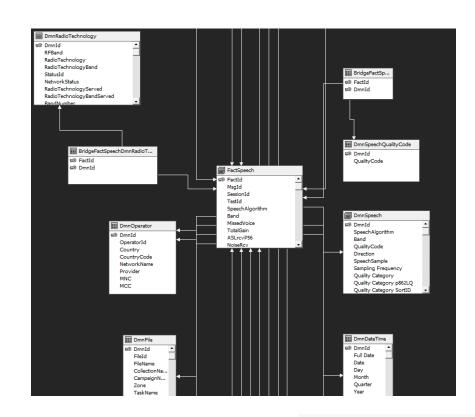 – SmartAnalytics can use existing NQDI databases after additional processing

► The OLAP Cube database requires a very strict underlying SQL data structure
  – The legacy NQDI Classic data structure is focused on copying the mf files 1:1
  – The SA data structure is focused on providing the flexible slicing and dicing that is inherent to the Cube database.
    – The SA SQL database structure is called a Snow Flake data structure

DATABASE STRUCTURE

► The term Snow Flake is used because the database organizes the data with relations tables in a very particular way.

- At the center sits a so-called Fact Table
  - The numeric values we measure
  - e.g. LQ MOS from FactSpeech
- It connects to various so-called Dimension Tables
  - Meta-information for grouping and filtering like the assignment to a test or operator
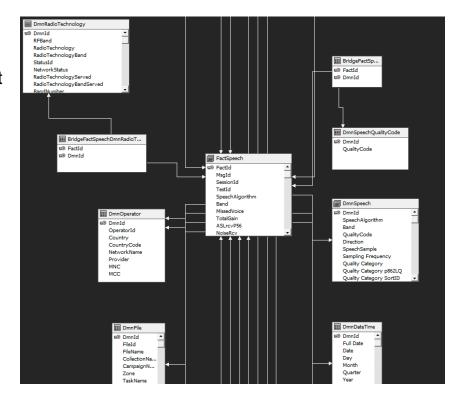- These relationships form a snowflake-like schema

DATABASE STRUCTURE

► This picture gives a good impression of how data from our measurements is divided between Fact Tables and Dimension Tables

► Particular recurring features are the FactId and the DmnId columns in these tables

– Used for joining the Facts and Dimensions consistently

– As a best-practice, also use these for your own joins when writing queries for custom SQL scripts!

► Some dimensions (e.g. DmnSession or DmnFile) are connected to every or almost every Fact Table

– These are referred to as *general* dimensions and can are grouped under "General" in the value tree of SA

► Other dimensions are only valid with a specific small set of facts (like DmnSpeech for FactSpeech)

– A filter for such a dimension will affect fewer views

DATABASE STRUCTURE

► The 3rd and final relevant type of tables are the Bridge Tables

– Required for connecting Dimensions to Facts that are not in a 1:1 relation to each other

– E.g. a call session featuring an inter-technology handover

– That session must not relate to a single cell or technology only

– Filters by a technology must also find calls with such handovers consistently

► The Bridge Tables are super simple as they only contain a reference to the FactIds and the DmnIds to connect

LOCATING DATA IN THE DATABASE

► Recap: 3 relevant table types

  – Fact Tables

    – FactSpeech

  – Dmn Tables

    – DmnFile

  – BridgeTables

    – BridgeFactSpeechDmnRadioTechnology

► There is a snowflake structure for almost every type of test or type of RF information

  – However, not every fact table has a cube built on top of it

► The R&S® SmartAnalytics - Value Items html documentation can guide you from the SA value tree to the actual table and column from which the values in the application originate.

LOCATING DATA IN THE DATABASE

► What if there is no FactTable or Dimension with the exact value I need to show?

  – Refer to the NQDI Classic database documentation to find the value

  – Write a custom SQL script to add a new KPI to the ResultsKPI table

    – Use a KPIId between 40'000 and 99'999 to avoid conflicts with system defaults

    – Explicitely leave [ResultsKPI].[Options] column empty to avoid problems with the KPIs name

    – Add a custom value definition in order to create a fitting value entry in the value tree of SA, with unit and value name for better formatted output in time domain views

► What if there is an appropriate Fact table, but I am missing a dimension value?

  – Write a custom SQL script to add a new SA Custom Category

    – Edit the color profile in SA to get ordering and coloring in bar charts right

LOCATING DATA IN THE DATABASE

► Special Tables

– SQSAETLProcessorLog

– The log output for all scripts that ran against a DB

– Also allows to see how far an ongoing processing has progressed

SELECT * FROM SQSAETLProcessorLog ORDER BY ID DESC

– SQSAVersionInfo

– A version history listing all upgrades of the SA snowflake schema
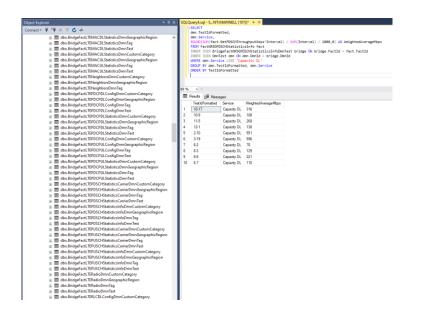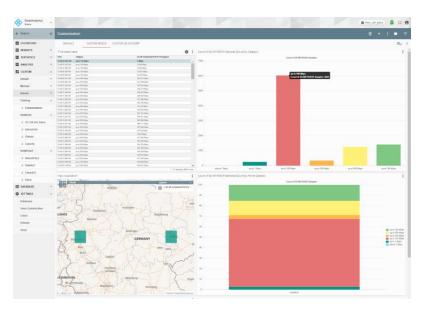
SELECT * FROM SQSAVersionInfo

DATA PROCESSING BENEFITS

► Building the Snowflake Structure costs a lot of SQL Server processing time, so what are the benefits, that the simple NQDI Classic data import cannot provide?

1. Extremely fast cube statistics also for large data sets at run-time

2. Almost countless precalculated combinations of values (not all make sense though)

3. Extremely powerful filtering and grouping possibilities

4. SA can seamlessly and consistently apply data selection (via dimensions) to both time domain and statistics data

5. A clean and transparent database structure to work against, also for custom scripting

DEMO

LESS KNOWN SA FEATURES

► Fill an existing table with a custom SQL Script to map scanner frequencies to an operator (5G NR only)

► ProblemSpots calculations

► Processing performance tweeks for special customer workflows

► Processing customizations

Q&A

THANK YOU