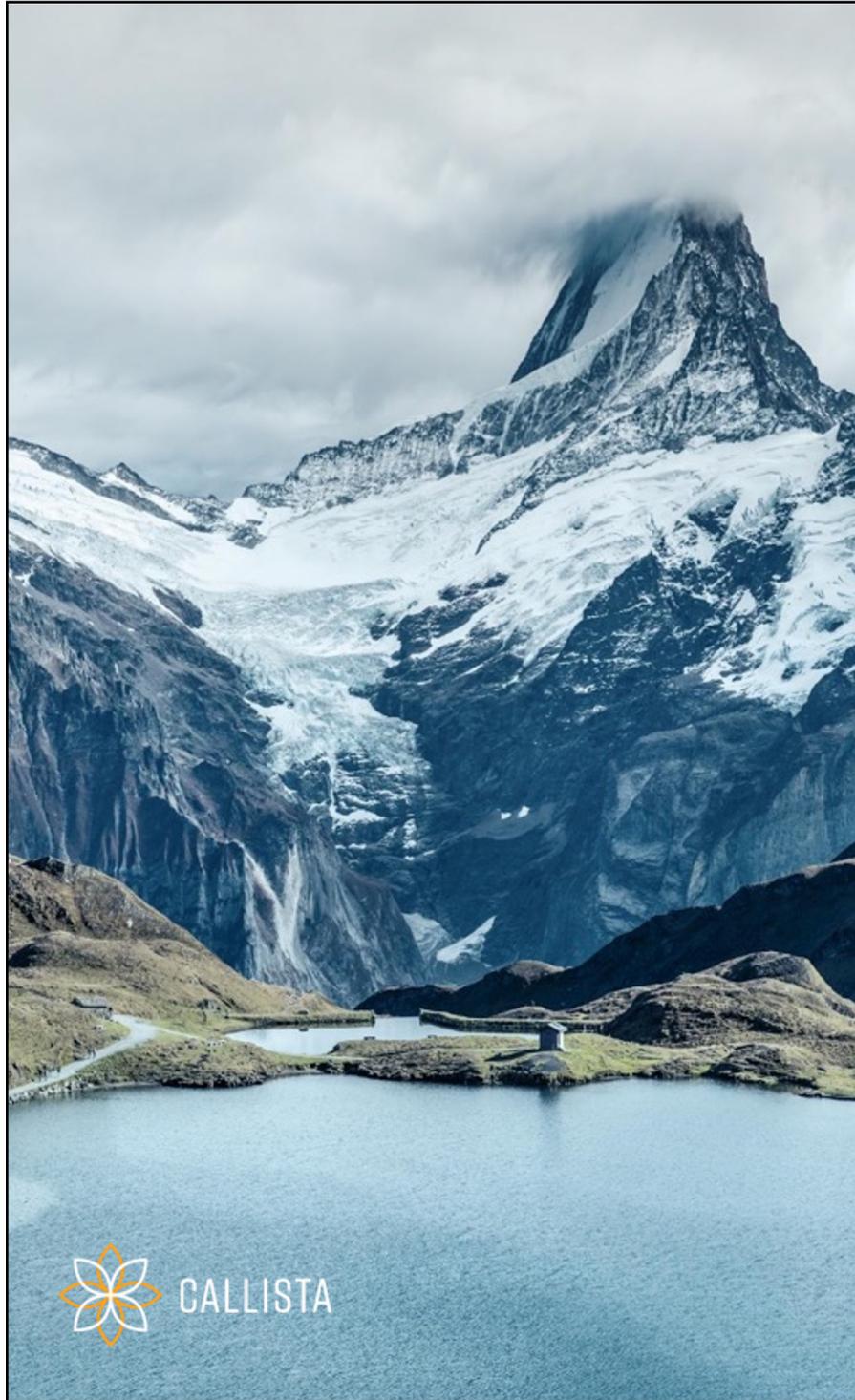


Constraints – Der praktische Werkzeugkasten



Dani Schnider



Data Integrity

SQL Domains

Check Constraints

Foreign Key Constraints

Data Model Documentation

DML Error Logging

Reliable Constraints

NOT NULL Constraints

Primary Key Constraints

Unique Constraints

Query Rewrite

Join Elimination

Performance

Referential Integrity



About me



Dani Schneider

- Working for Callista
- Oracle ACE Director
- Member of Symposium 42
- Hobby: Craft Beer Brewing





Live Demo Part 1

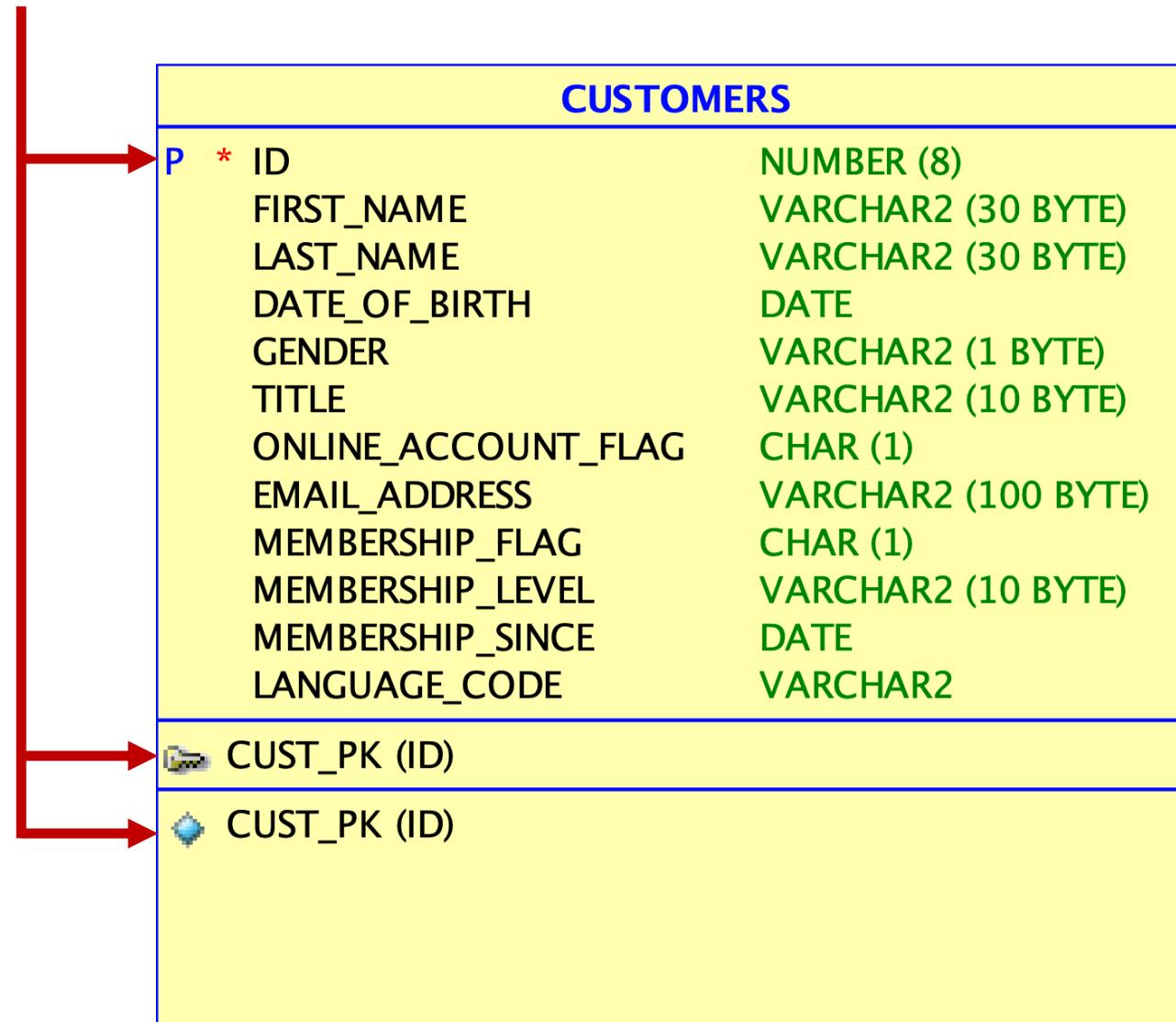
- Primary Key Constraint
- NOT NULL Constraints
- Check Constraints
- Unique Constraint

Create Table CUSTOMERS

CUSTOMERS	
ID	NUMBER (8)
FIRST_NAME	VARCHAR2 (30 BYTE)
LAST_NAME	VARCHAR2 (30 BYTE)
DATE_OF_BIRTH	DATE
GENDER	VARCHAR2 (1 BYTE)
TITLE	VARCHAR2 (10 BYTE)
ONLINE_ACCOUNT_FLAG	CHAR (1)
EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
MEMBERSHIP_FLAG	CHAR (1)
MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
MEMBERSHIP_SINCE	DATE
LANGUAGE_CODE	VARCHAR2

Primary Key Constraint

- Uniqueness guaranteed
- No NULL values allowed
- Typically one column, but multiple columns allowed
- Unique index created automatically



NOT NULL Constraints

- No NULL values allowed
- Implemented as a check constraint
- By default, NULL values are allowed for all columns

CUSTOMERS		
P	* ID	NUMBER (8)
	* FIRST_NAME	VARCHAR2 (30 BYTE)
	* LAST_NAME	VARCHAR2 (30 BYTE)
	* DATE_OF_BIRTH	DATE
	* GENDER	VARCHAR2 (1 BYTE)
	TITLE	VARCHAR2 (10 BYTE)
	* ONLINE_ACCOUNT_FLAG	CHAR (1)
	EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
	* MEMBERSHIP_FLAG	CHAR (1)
	MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
	MEMBERSHIP_SINCE	DATE
	* LANGUAGE_CODE	VARCHAR2
	CUST_PK (ID)	
	CUST_PK (ID)	

Check Constraints

- User-defined condition on a column or a set of columns
- Typically used to implement business rules

CUSTOMERS		
P *	ID	NUMBER (8)
*	FIRST_NAME	VARCHAR2 (30 BYTE)
*	LAST_NAME	VARCHAR2 (30 BYTE)
*	DATE_OF_BIRTH	DATE
*	GENDER	VARCHAR2 (1 BYTE)
	TITLE	VARCHAR2 (10 BYTE)
*	ONLINE_ACCOUNT_FLAG	CHAR (1)
	EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
*	MEMBERSHIP_FLAG	CHAR (1)
	MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
	MEMBERSHIP_SINCE	DATE
*	LANGUAGE_CODE	VARCHAR2
	CUST_PK (ID)	
	CUST_PK (ID)	

Unique Constraint

- Uniqueness guaranteed
- NULL values are allowed
- Created on one or more business key columns
- Unique index created automatically

CUSTOMERS		
P	* ID	NUMBER (8)
	* FIRST_NAME	VARCHAR2 (30 BYTE)
	* LAST_NAME	VARCHAR2 (30 BYTE)
	* DATE_OF_BIRTH	DATE
	* GENDER	VARCHAR2 (1 BYTE)
	TITLE	VARCHAR2 (10 BYTE)
	* ONLINE_ACCOUNT_FLAG	CHAR (1)
U	EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
	* MEMBERSHIP_FLAG	CHAR (1)
	MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
	MEMBERSHIP_SINCE	DATE
	* LANGUAGE_CODE	VARCHAR2
	CUST_PK (ID)	
	CUST_EMAIL_UK (EMAIL_ADDRESS)	
	CUST_EMAIL_UK (EMAIL_ADDRESS)	
	CUST_PK (ID)	



Live Demo Part 2

- DML Error Logging
- SQL Domains
- Foreign Key Constraint

Foreign Key Constraint

- Referential integrity between parent and child table
- Refers primary key (or unique key) of parent table
- Check for INSERT/UPDATE: All values must exist in parent table
- Check for DELETE on parent table: No dependent records must exist in child table

CUSTOMERS		
P	* ID	NUMBER (8)
	* FIRST_NAME	VARCHAR2 (30 BYTE)
	* LAST_NAME	VARCHAR2 (30 BYTE)
	* DATE_OF_BIRTH	DATE
	* GENDER	VARCHAR2 (1 BYTE)
	TITLE	VARCHAR2 (10 BYTE)
	* ONLINE_ACCOUNT_FLAG	CHAR (1)
U	EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
	* MEMBERSHIP_FLAG	CHAR (1)
	MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
	MEMBERSHIP_SINCE	DATE
F	* LANGUAGE_CODE	VARCHAR2 (2 BYTE)
	CUST_PK (ID)	
	CUST_EMAIL_UK (EMAIL_ADDRESS)	
	CUST_LANG_FK (LANGUAGE_CODE)	
	CUST_EMAIL_UK (EMAIL_ADDRESS)	
	CUST_PK (ID)	

P	* C
	* D
	* D
	LA
	LA

Purpose of Constraints

- Data Integrity



- Documentation



- Performance



CUSTOMERS		
P	* ID	NUMBER (8)
	* FIRST_NAME	VARCHAR2 (30 BYTE)
	* LAST_NAME	VARCHAR2 (30 BYTE)
	* DATE_OF_BIRTH	DATE
	* GENDER	VARCHAR2 (1 BYTE)
	TITLE	VARCHAR2 (10 BYTE)
	* ONLINE_ACCOUNT_FLAG	UNKNOWN
U	EMAIL_ADDRESS	VARCHAR2 (100 BYTE)
	* MEMBERSHIP_FLAG	UNKNOWN
	MEMBERSHIP_LEVEL	VARCHAR2 (10 BYTE)
	MEMBERSHIP_SINCE	DATE
F	* LANGUAGE_CODE	VARCHAR2 (2 BYTE)
◆ CUST_EMAIL_UK (EMAIL_ADDRESS)		
🔑 CUST_PK (ID)		
🔗 CUST_LANG_FK (LANGUAGE_CODE)		
◆ CUST_EMAIL_UK (EMAIL_ADDRESS)		
◆ CUST_PK (ID)		

LANGUAGES		
P	* CODE	VARCHAR2 (2 BYTE)
	* DESCRIPTION_EN	VARCHAR2 (100 BYTE)
	* DESCRIPTION_DE	VARCHAR2 (100 BYTE)
🔑 LANG_PK (CODE)		
◆ LANG_PK (CODE)		

ADDRESSES		
P	* ID	NUMBER (8)
F	* CUST_ID	NUMBER (8)
F	* ADR_TYPE	VARCHAR2 (2 BYTE)
	STREET	VARCHAR2 (40 BYTE)
	STREET_NO	VARCHAR2 (10 BYTE)
	* ZIP_CODE	VARCHAR2 (10 BYTE)
	* CITY	VARCHAR2 (40 BYTE)
F	* CTR_CODE	VARCHAR2 (2 BYTE)
🔑 ADR_PK (ID)		
🔗 ADR_ATP_FK (ADR_TYPE)		
🔗 ADR_CTR_FK (CTR_CODE)		
🔗 ADR_CUST_FK (CUST_ID)		
◆ ADR_CTR_CODE (CTR_CODE)		
◆ ADR_CUST_ID (CUST_ID)		
◆ ADR_PK (ID)		

ADR_TYPES		
P	* ADR_TYPE	VARCHAR2 (2 BYTE)
	* LABEL	VARCHAR2 (20 BYTE)
🔑 ATP_PK (ADR_TYPE)		
◆ ATP_PK (ADR_TYPE)		

COUNTRIES		
P	* CODE	VARCHAR2 (2 BYTE)
	* NAME	VARCHAR2 (100 BYTE)
🔑 CTR_PK (CODE)		
◆ CTR_PK (CODE)		

ORDERS		
P	* ID	NUMBER (8)
F	* CUST_ID	NUMBER (8)
	* ORDER_DATE	DATE
🔑 ORD_PK (ID)		
🔗 ORD_CUST_FK (CUST_ID)		
◆ ORD_CUST_ID (CUST_ID)		
◆ ORD_PK (ID)		

ORDER_ITEMS		
P	* ID	NUMBER (8)
UF	* ORDER_ID	NUMBER (8)
U	* LINE_NO	NUMBER (2)
F	* PROD_ID	NUMBER (8)
	DELIVERY_DATE	DATE
	* QUANTITY	NUMBER (3)
	* PRICE_PER_UNIT	NUMBER (8,2)
◆ ORDI_ORDER_LINE_UK (ORDER_ID, LINE_NO)		
🔑 ORDI_PK (ID)		
🔗 ORDI_ORD_FK (ORDER_ID)		
🔗 ORDI_PROD_FK (PROD_ID)		
◆ ORDI_ORDER_LINE_UK (ORDER_ID, LINE_NO)		
◆ ORDI_PK (ID)		

PRODUCTS		
P	* ID	NUMBER (8)
	* PROD_NAME	VARCHAR2 (50 BYTE)
	* PROD_DESC	VARCHAR2 (4000 BYTE)
	* PROD_CATEGORY	VARCHAR2 (50 BYTE)
	SUPPLIER_ID	NUMBER (8)
	NUM_ON_STOCK	NUMBER (5)
	LIST_PRICE	NUMBER (8,2)
	MIN_PRICE	NUMBER (8,2)
🔑 PROD_PK (ID)		
◆ PROD_PK (ID)		

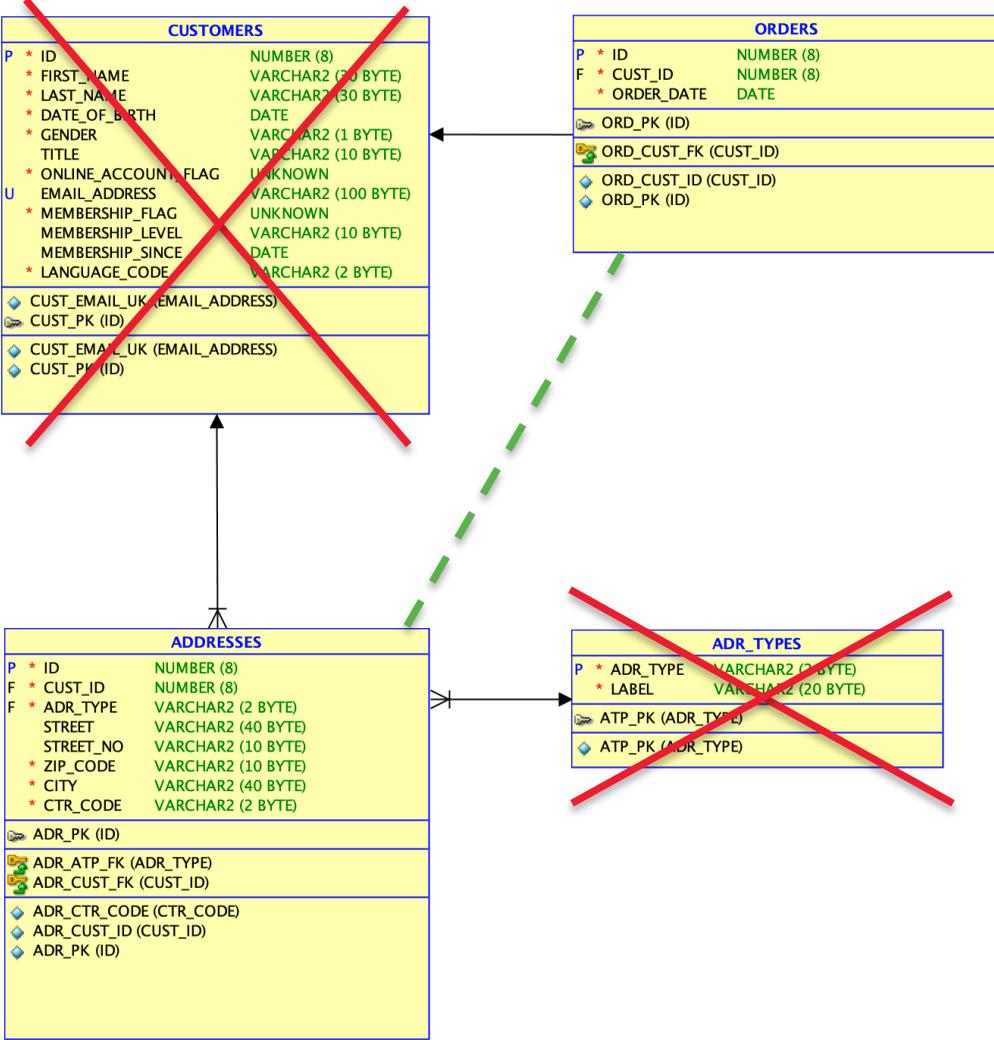




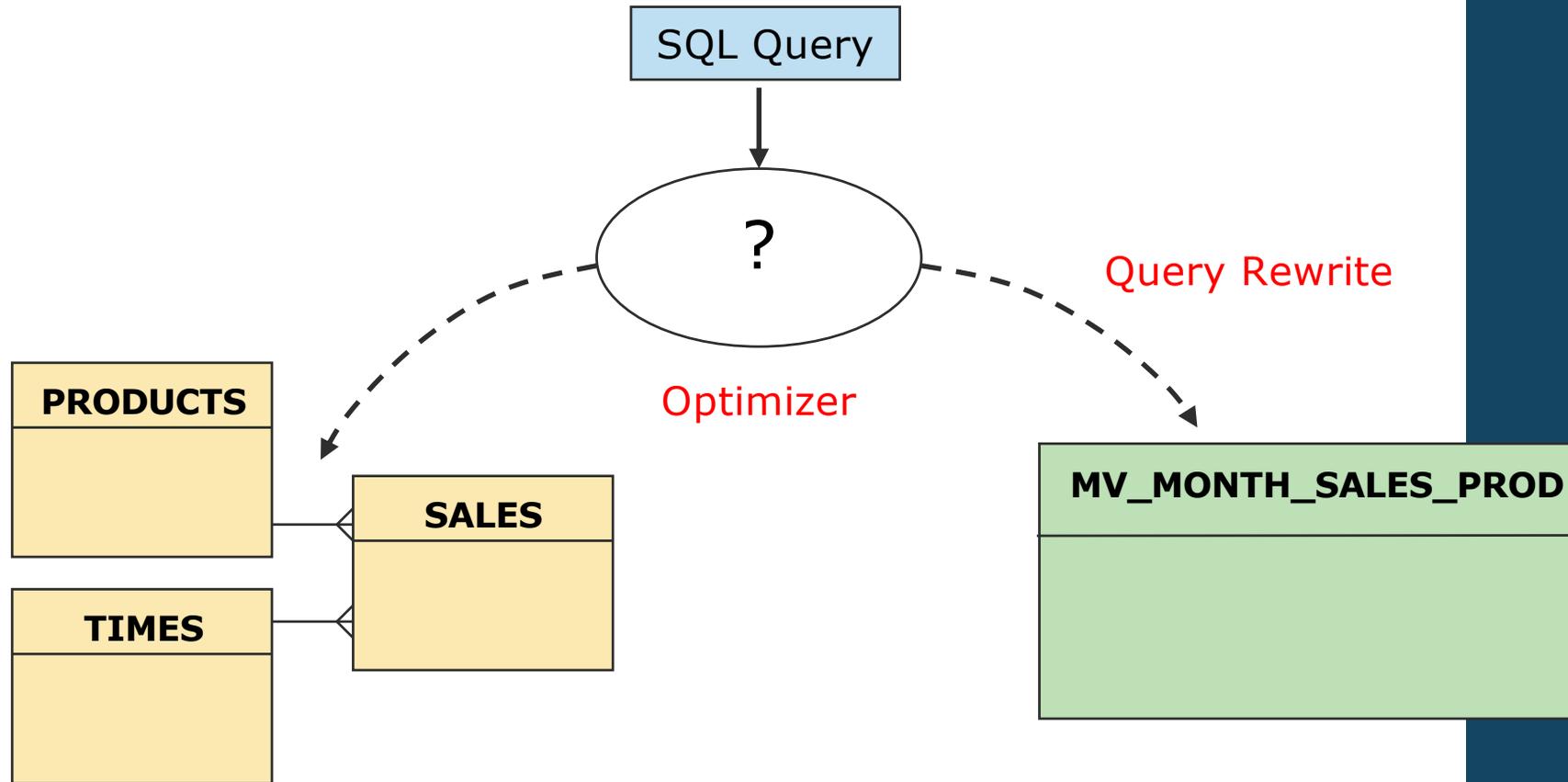
Live Demo Part 3

- Create Full Demo Schema
 - Primary Key Constraints
 - Unique Constraints
 - Foreign Key Constraints
- Performance
 - Foreign Key Indexes
 - Function Calls
 - Join Elimination

Performance: Join Elimination



Performance: Query Rewrite



Reliable Constraints

```
ALTER TABLE customers  
ADD CONSTRAINT cust_pk  
PRIMARY KEY (id) RELY;
```



```
ALTER TABLE addresses  
ADD CONSTRAINT adr_cust_fk  
FOREIGN KEY (cust_id)  
REFERENCES customers  
RELY DISABLE NOVALIDATE;
```



- Often used in data warehouses
- Data integrity checks disabled
- Constraints still available for documentation and performance

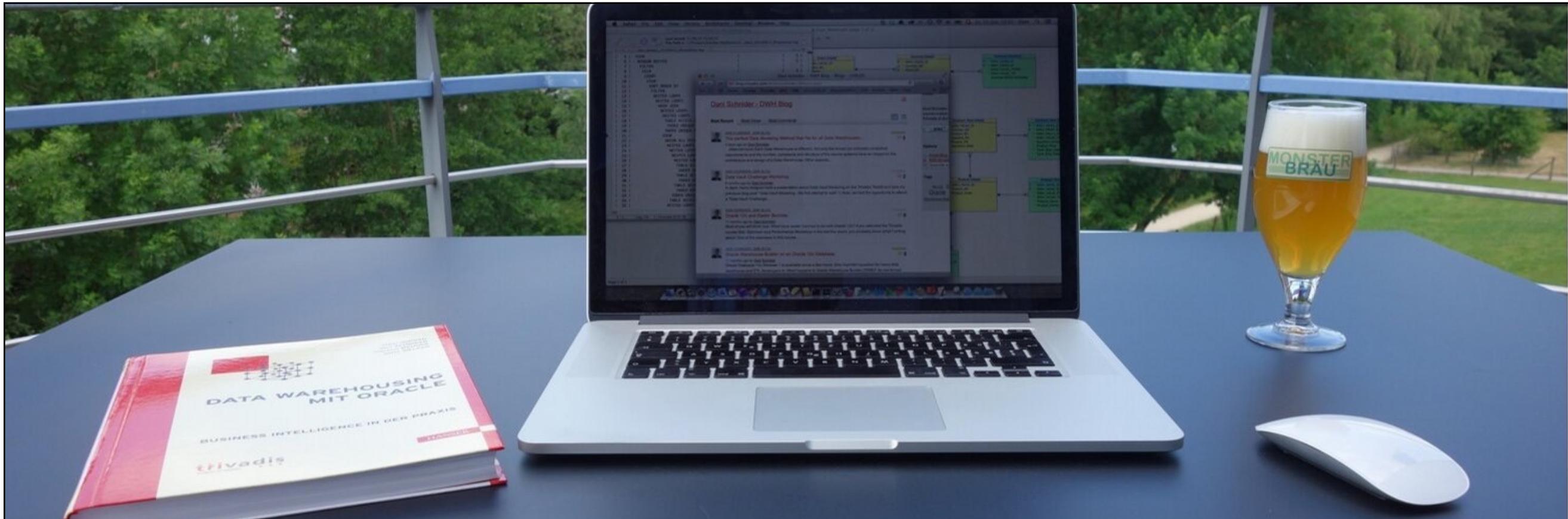


Live Demo Part 4

- Delete Data
 - ON DELETE CASCADE
 - ON DELETE SET NULL
- Reference Partitioning

Constraints for Performance: Further Reading

- About Reliable Constraints:
Foreign Key Constraints in an Oracle Data Warehouse
<https://danischnider.wordpress.com/2015/12/01/foreign-key-constraints-in-an-oracle-data-warehouse/>
- About Join Elimination:
Data Vault Queries and Join Elimination
<https://danischnider.wordpress.com/2019/12/27/data-vault-queries-and-join-elimination/>
- About Query Rewrite:
Design Tips for Query Rewrite
<https://danischnider.wordpress.com/2020/04/01/design-tips-for-query-rewrite/>
- About Function Calls:
Performance Tips: Function Calls in WHERE Conditions
<https://danischnider.wordpress.com/2022/02/28/performance-tips-function-calls-in-where-conditions/>
- About Reference Partitioning:
Housekeeping in Oracle: How to Get Rid of Old Data
<https://danischnider.wordpress.com/2022/07/02/housekeeping-in-oracle-how-to-get-rid-of-old-data/>

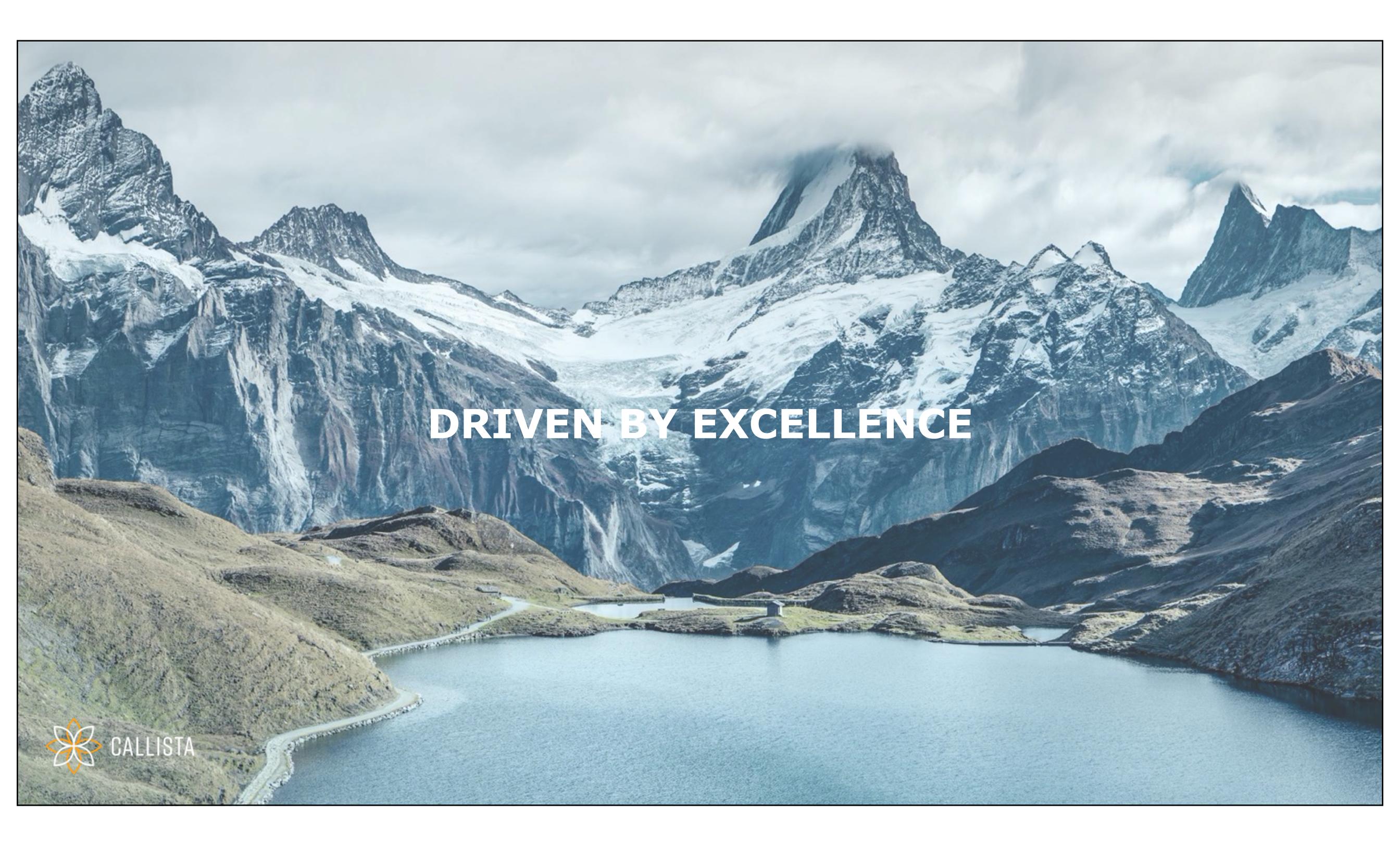


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 <https://www.linkedin.com/in/danischnider/>

Q&A

A wide-angle landscape photograph of a mountain range. The foreground features a large, calm blue lake with a paved path along its edge. The middle ground shows rolling hills with sparse vegetation. The background is dominated by towering, rugged mountains with significant snow cover and patches of glaciers. The sky is filled with soft, grey clouds.

DRIVEN BY EXCELLENCE