

***Rotman***

**Master of  
Management  
Analytics**

# INTRO TO SAS VIYA VISUAL TOOLSET

SAS Bootcamp 1 (2 hours)

August 9, 2019 Prepared by Jay Cao / TDMDL



Rotman School of Management  
UNIVERSITY OF TORONTO

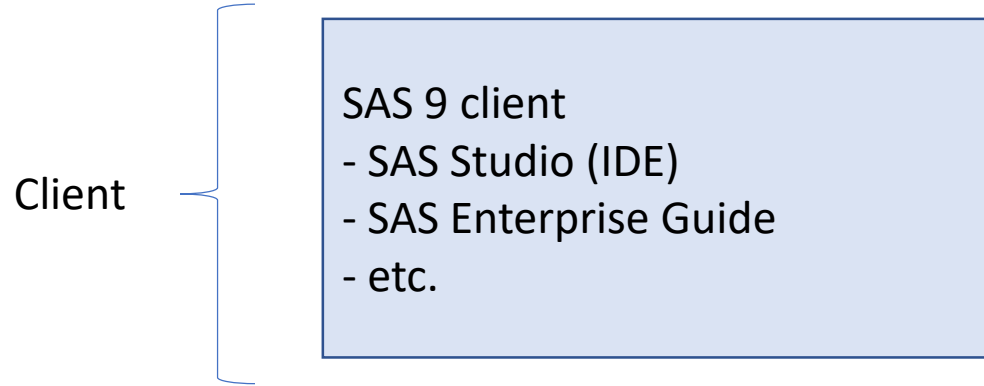
# Plan and Goal

- Plan
  - SAS Viya big picture overview
  - Hands-on with SAS Viya visual toolset
- Goal: learn the basics of
  - SAS Viya visual toolset
  - data processing and modeling work flow

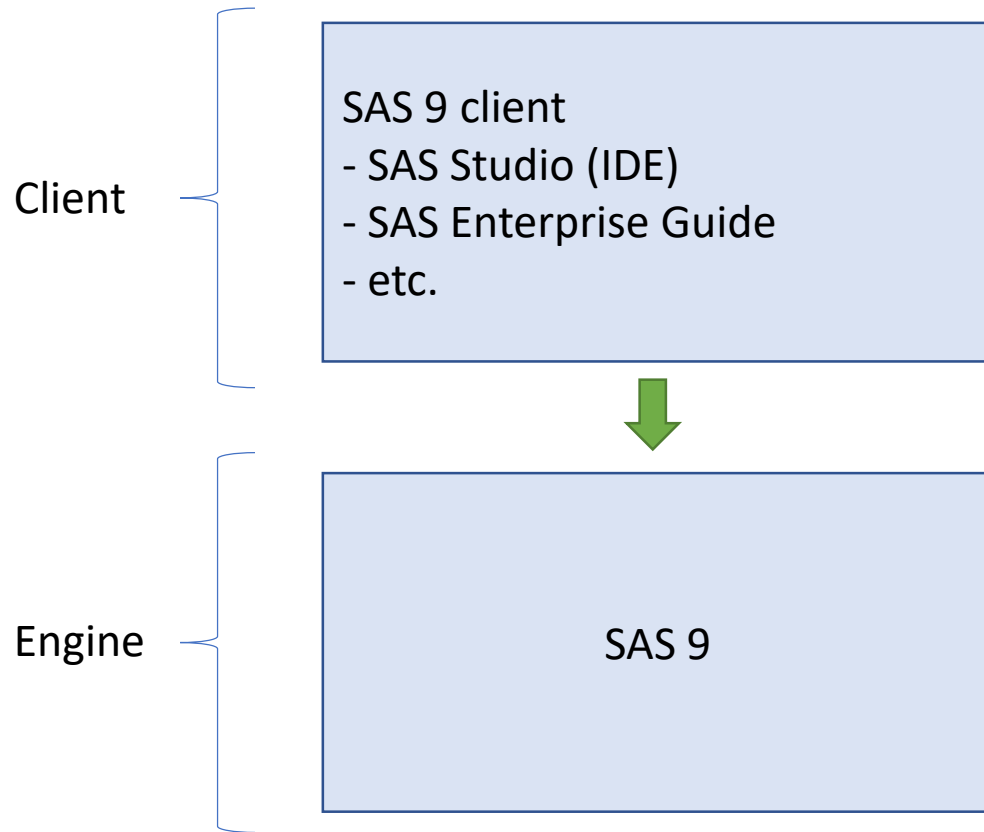
# What's SAS

- An analytics software suite
  - Retrieve data from different sources
  - Manage and manipulate data
  - Perform analytics
  - Report and visualize results
- Widely used by big companies in major industries
  - Health, banking, finance, government, etc.

# SAS 9 vs SAS Viya: Two SAS Engines

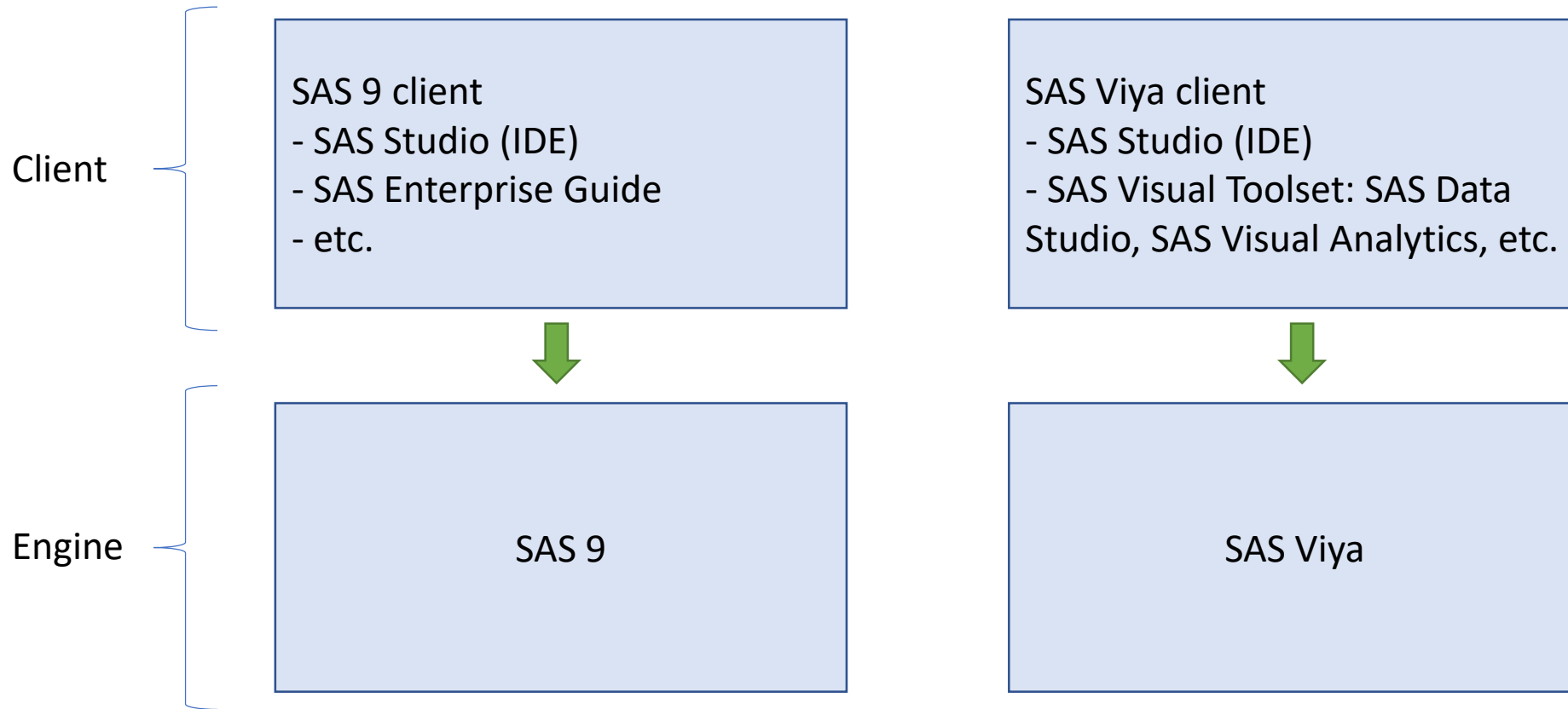


# SAS 9 vs SAS Viya: Two SAS Engines



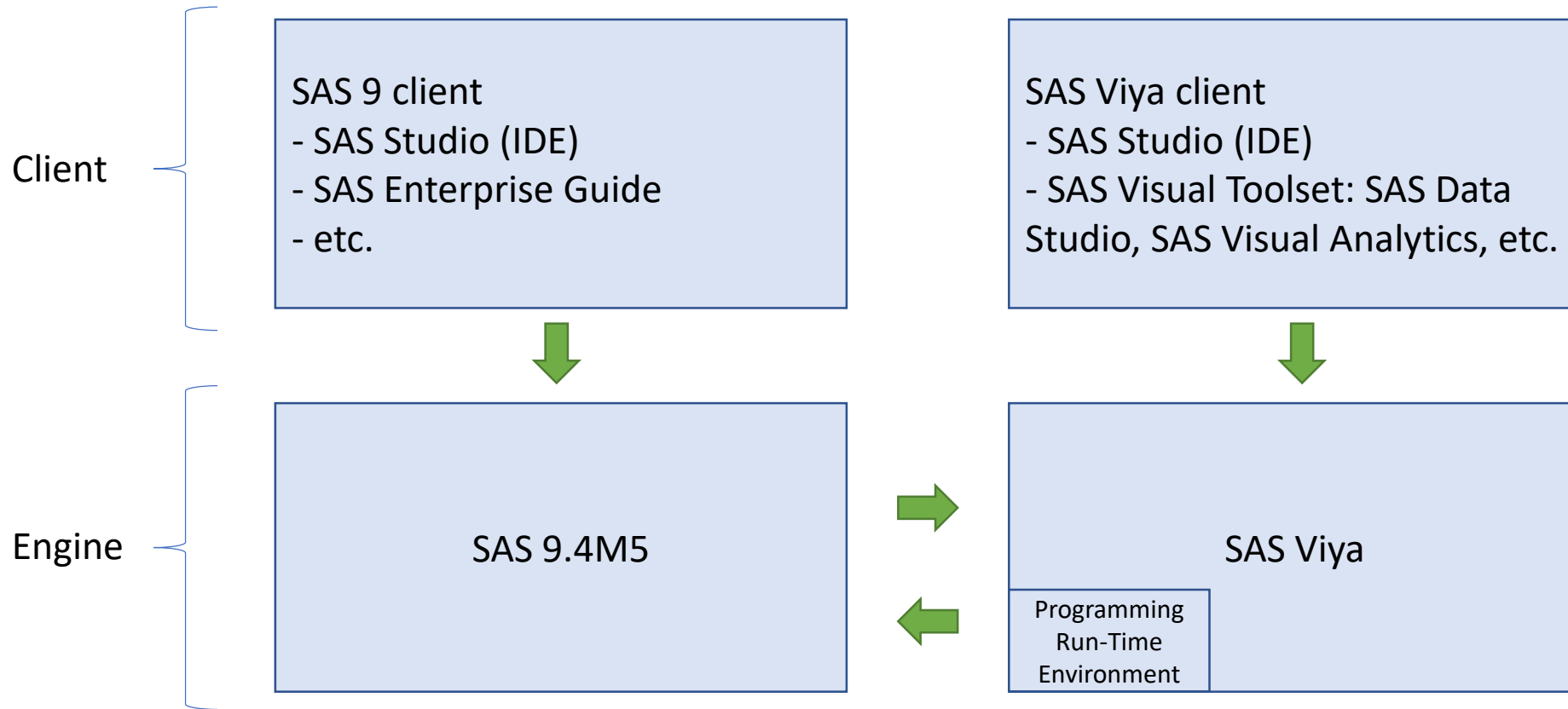
Ref. 1) [SAS 9 and SAS Viya](#); 2) [SAS 9 and SAS Viya Functional Comparison](#)

# SAS 9 vs SAS Viya: Two SAS Engines



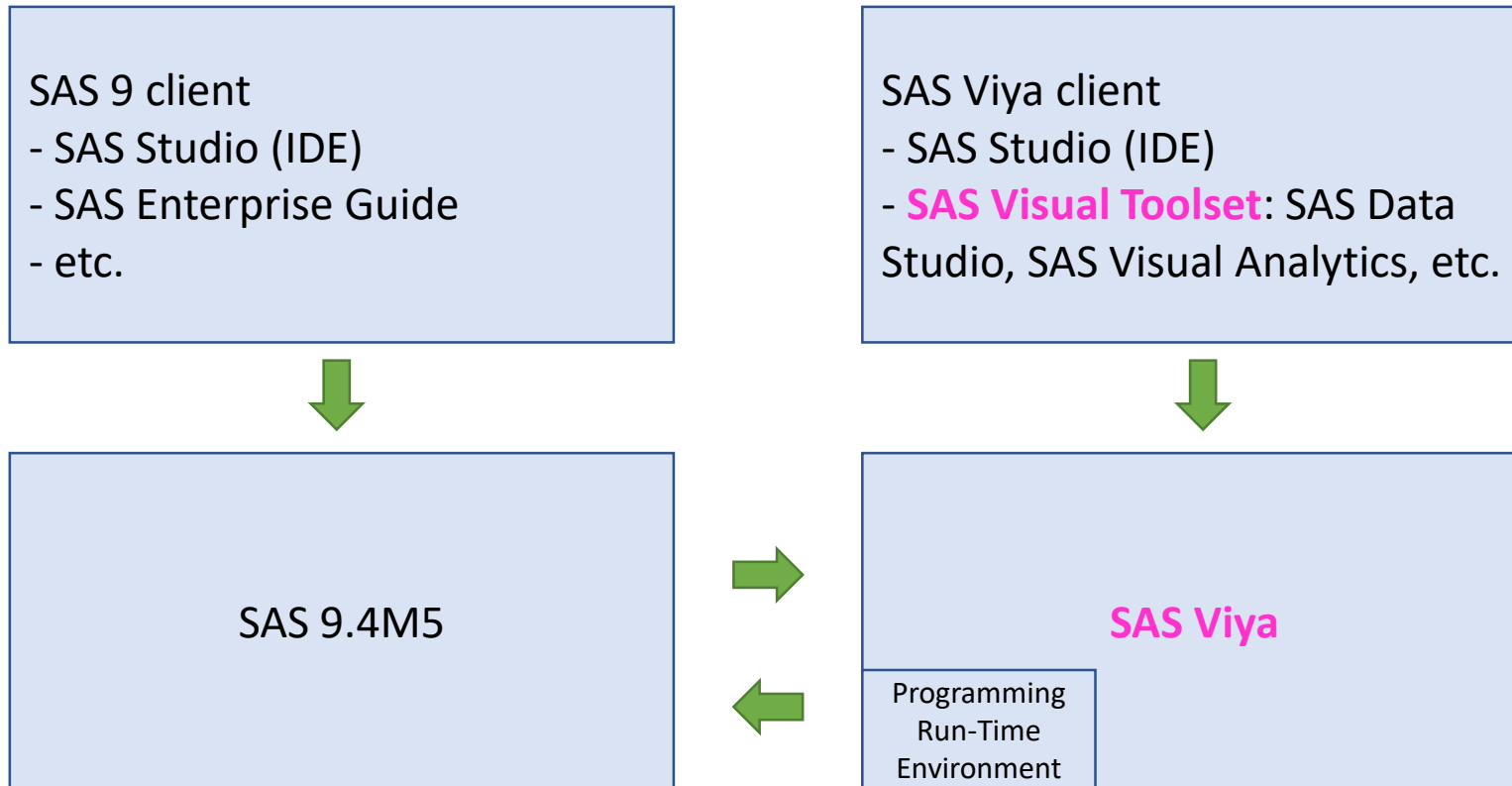
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# SAS 9 vs SAS Viya: Two SAS Engines



Ref. 1) [SAS 9 and SAS Viya](#); 2) [SAS 9 and SAS Viya Functional Comparison](#)

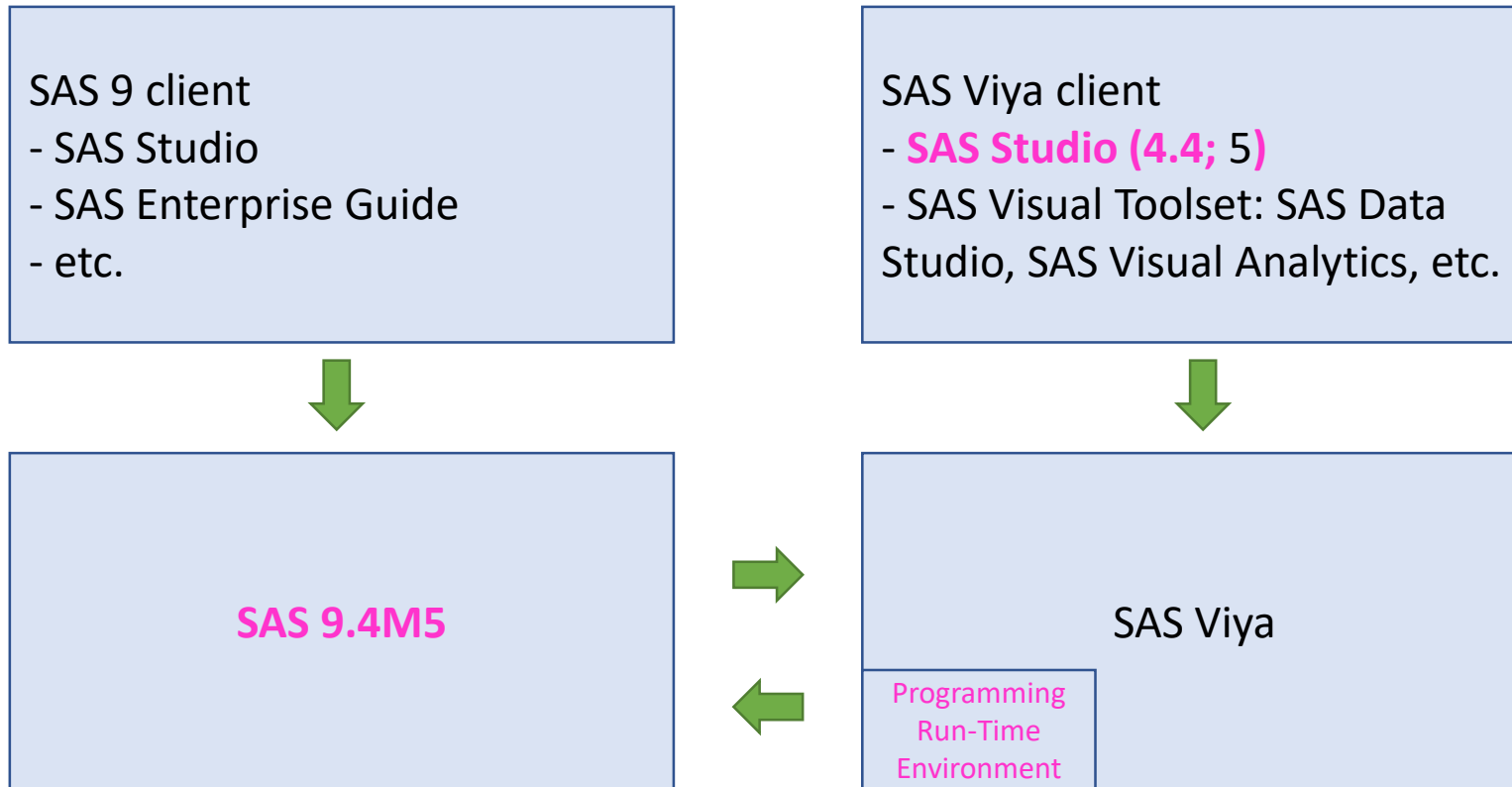
# SAS 9 vs SAS Viya (Workshop 1)



Ref. 1) [SAS 9 and SAS Viya](#); 2) [SAS 9 and SAS Viya Functional Comparison](#)

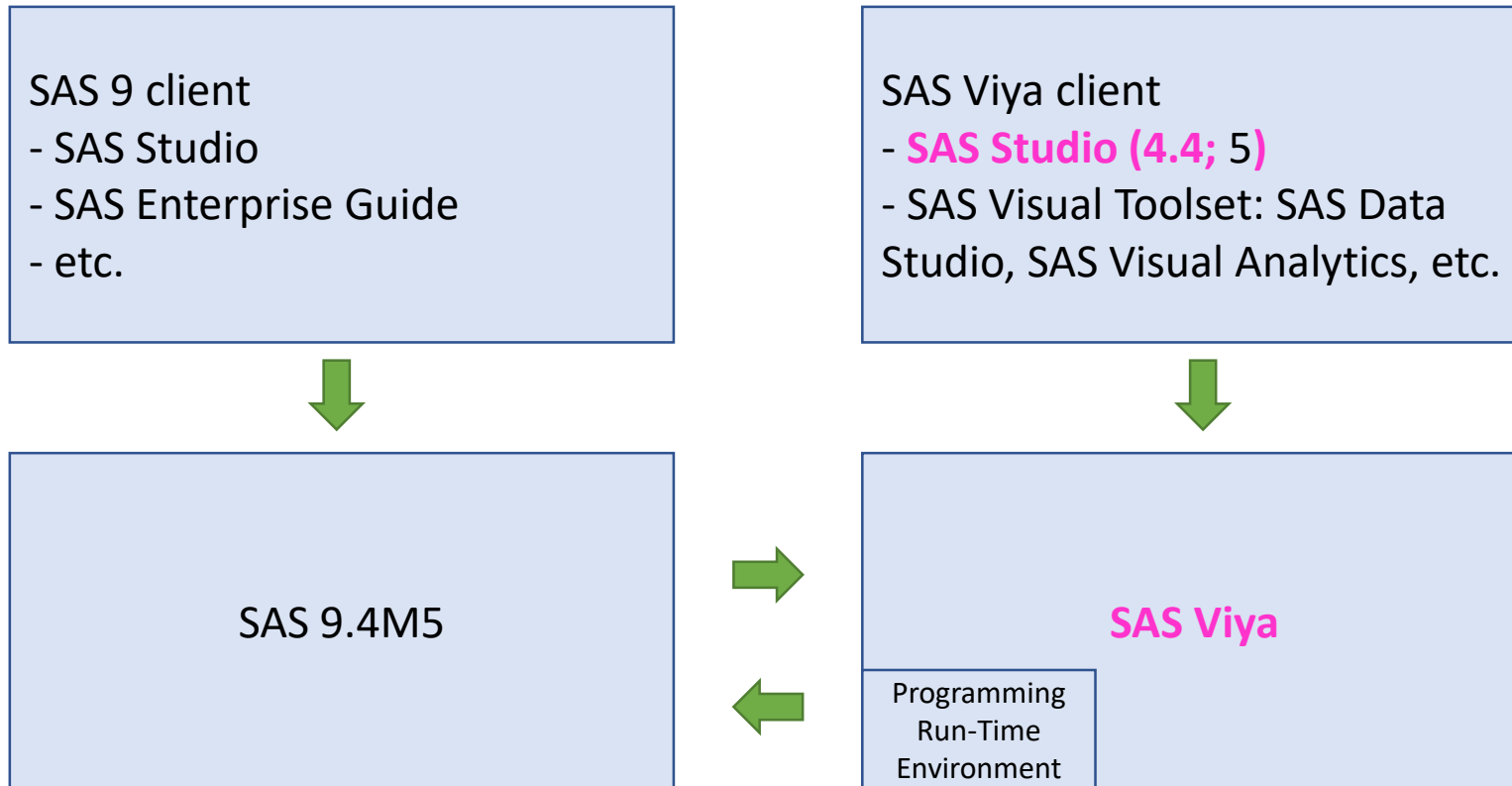


# SAS 9 vs SAS Viya (Workshop 2)



Ref. 1) [SAS 9 and SAS Viya](#); 2) [SAS 9 and SAS Viya Functional Comparison](#)

# SAS 9 vs SAS Viya (if we have time)

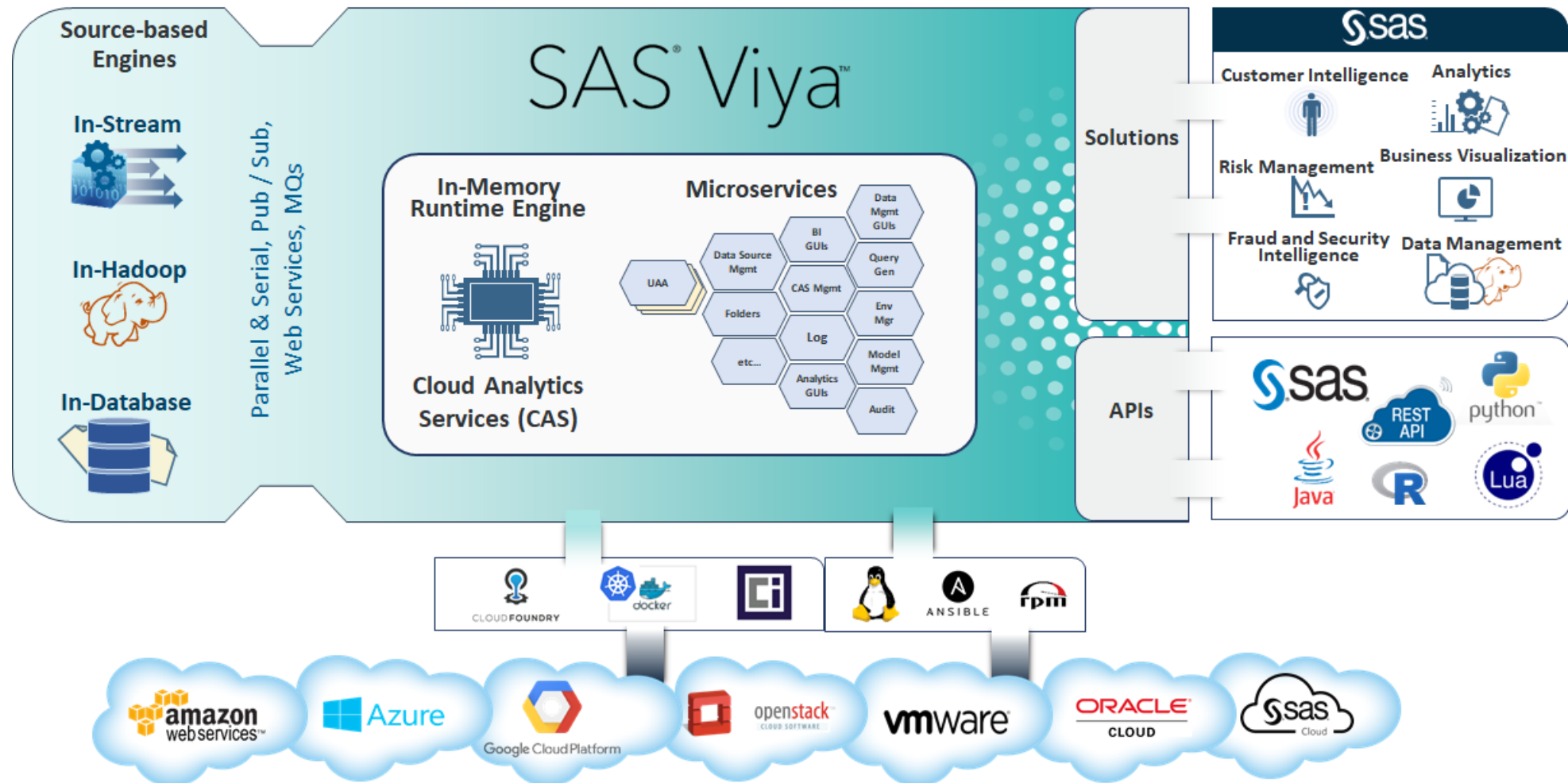


Ref. 1) [SAS 9 and SAS Viya](#); 2) [SAS 9 and SAS Viya Functional Comparison](#)

# SAS Viya

- In-memory analytics engine
  - fast
- Cloud-enabled
  - Elastic, scalable, and fault-tolerant
- Interface to open-source programming languages ([APIs](#))
  - Python ([Python-SWAT](#)), R ([R-SWAT](#)), etc.

# SAS Viya Cloud Architecture



Ref. <https://blogs.sas.com/content/hiddeninsights/2019/01/11/how-to-get-your-head-in-the-cloud/#prettyPhoto>

# SAS Viya Visual Toolset Overview - SAS Drive

- A hub for SAS visual tools
  - SAS Data Prepare
  - SAS Visual Analytics, SAS Visual Statistics etc.
  - SAS Model Studio
- A place to organize and share content

# SAS Viya Visual Toolset Overview - Tools

- Data Manipulation
  - SAS Data Prepare (Data Explorer, Data Studio, and Lineage Viewer)
- Analytics & Modeling
  - SAS Visual Analytics
  - SAS Visual Statistics
  - ...
- Model Building, Pipeline and Comparison
  - SAS Model Studio (SAS Visual Data Mining and Machine Learning, etc.)

# SAS Data Prepare

- SAS Data Explorer – Manage Data
  - Load and profile data
- SAS Data Studio – Prepare Data
  - Manipulate/transform data
- SAS Lineage Viewer – Explore Lineage
  - Visualize objects in Viya (data, transformation process, report, visualization, model, etc.)

Ref. <https://support.sas.com/en/software/sas-data-preparation-support.html>

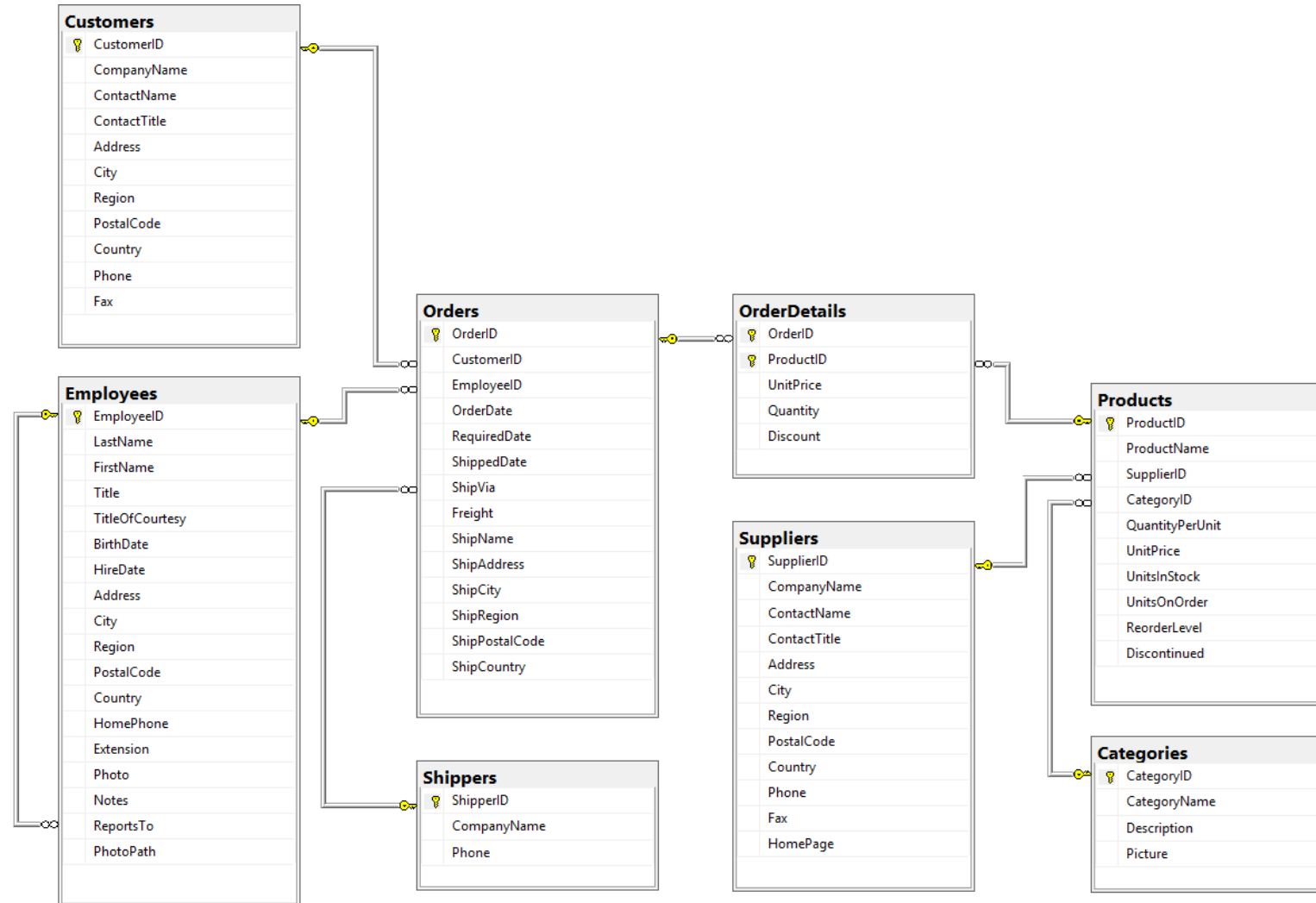
# SAS Data Explorer & Data Studio – Q1

- Q1. Who are hired in 2011?
  - Use the Northwind Employees dataset
    - all datasets used today are on course website: <https://tdmdal.github.io/mma-sas/>
- Steps
  - Load the employee dataset
  - Convert HireDate from VARCHAR type to NUMERIC/DATETIME type (or NUMERIC/DATE)
  - Filter to obtain employees hired in 2011

Ref. informat: [ANYDTDTMw.](#); [ANYDTDTEw.](#)



# The Northwind Dataset



# SAS Data Explorer & Data Studio – Q2

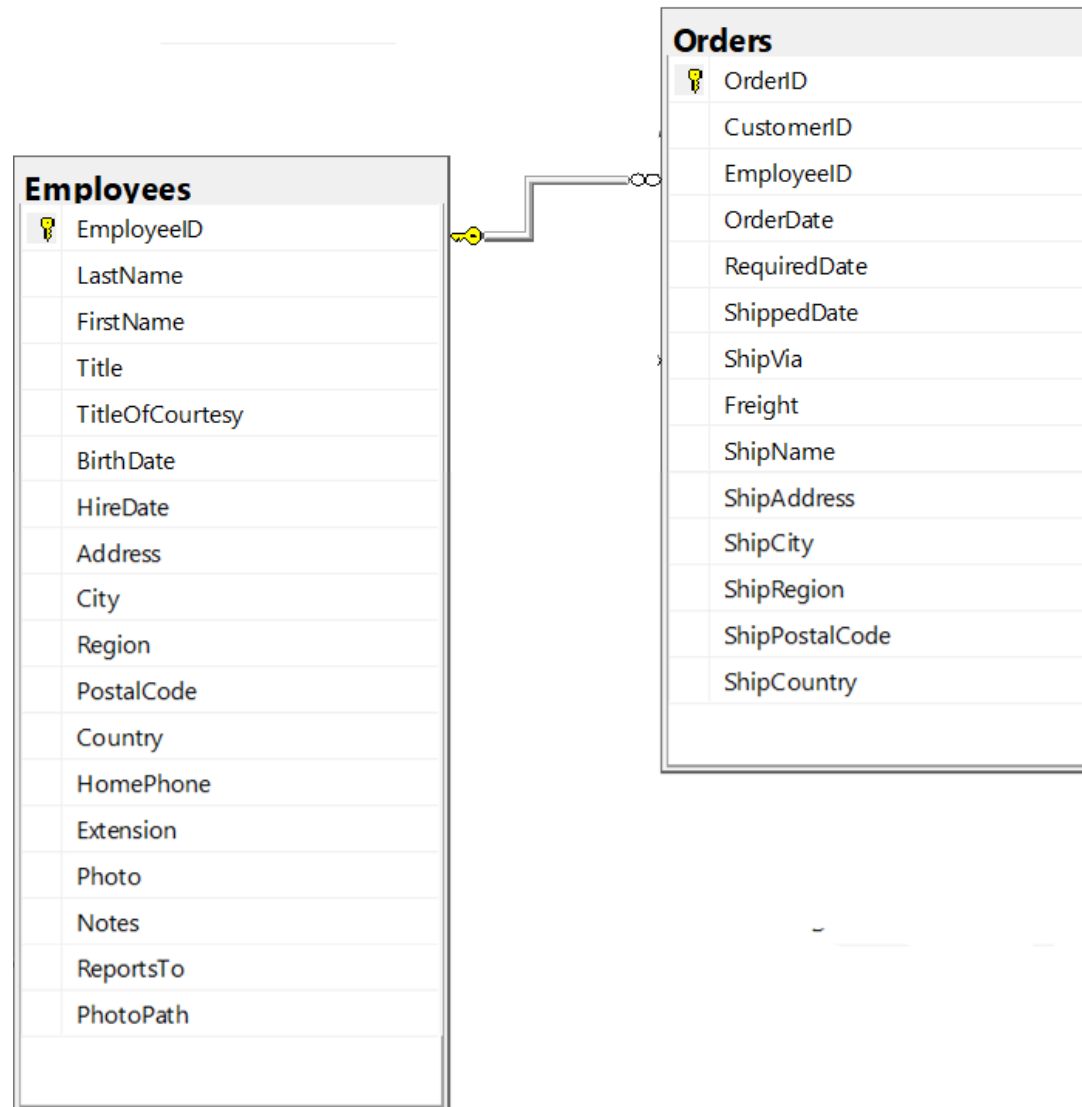
- Q2. How old are the employees when they were hired?
  - Use the Employees dataset
- Steps
  - Load the employee dataset
  - Convert...
  - Calculate... (Hint: use Custom Transforms -> Calculated column; and see Ref. )

Ref. [YRDIF\(\)](#); [INT\(\)](#)

# SAS Data Explorer & Data Studio – Q3

- Q3. Who fulfilled the order 10248 (OrderID = 10248)
  - Use the Employees and Orders datasets
- Steps
  - Load Orders datasets
  - Join Orders table with Employees table using EmployeeID
  - Filter the resulting table to show the order with OrderID = 10248

# Join Employees and Orders datasets



# Join – Inner Join

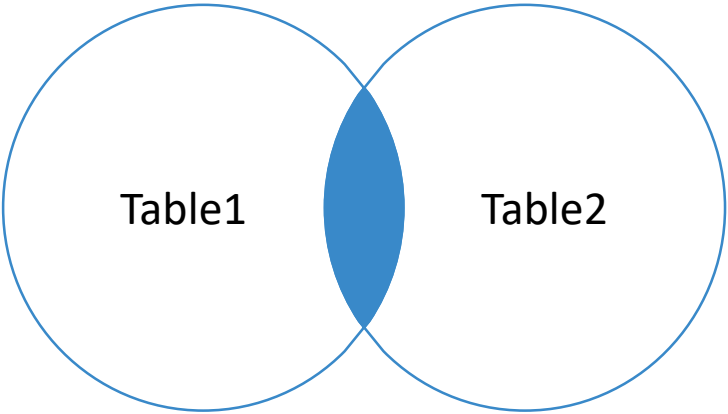


Table1

pk	t1c1
1	a
2	b

Table2

fk	t2c1
1	c
1	d
3	e

pk	t1c1	fk	t2c1
1	a	1	c
1	a	1	d

# Join – Left (Outer) Join

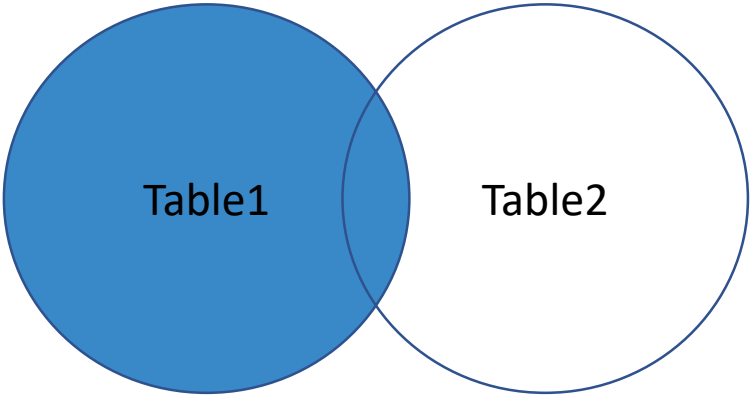


Table1

pk	t1c1
1	a
2	b

Table2

fk	t2c1
1	c
1	d
3	e

pk	t1c1	fk	t2c1
1	a	1	c
1	a	1	d
2	b	null	null

# Join – Right Outer Join\*

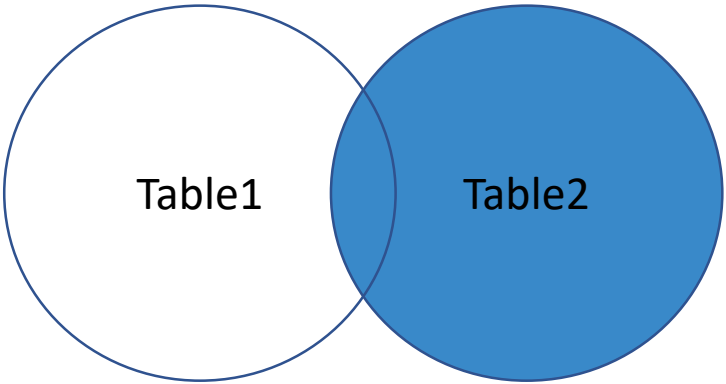


Table1

pk	t1c1
1	a
2	b

Table2

fk	t2c1
1	c
1	d
3	e

pk	t1c1	fk	t2c1
1	a	1	c
1	a	1	d
null	null	3	e

# Join – Full (Outer) Join

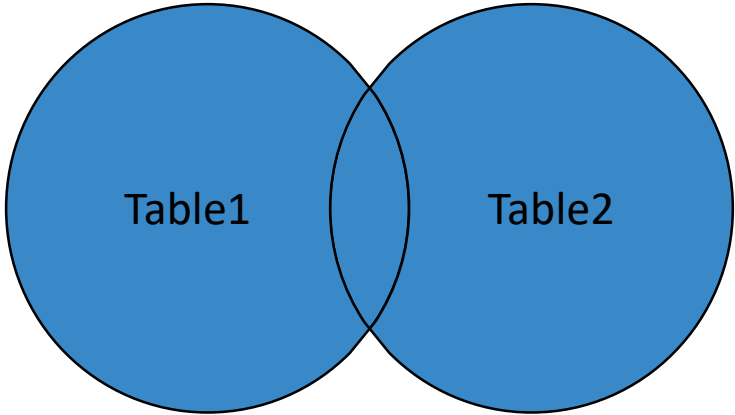


Table1

pk	t1c1
1	a
2	b

Table2

fk	t2c1
1	c
1	d
3	e

pk	t1c1	fk	t2c1
1	a	1	c
1	a	1	d
2	b	null	null
null	null	3	e



# SAS Data Explorer & Data Studio – Q4

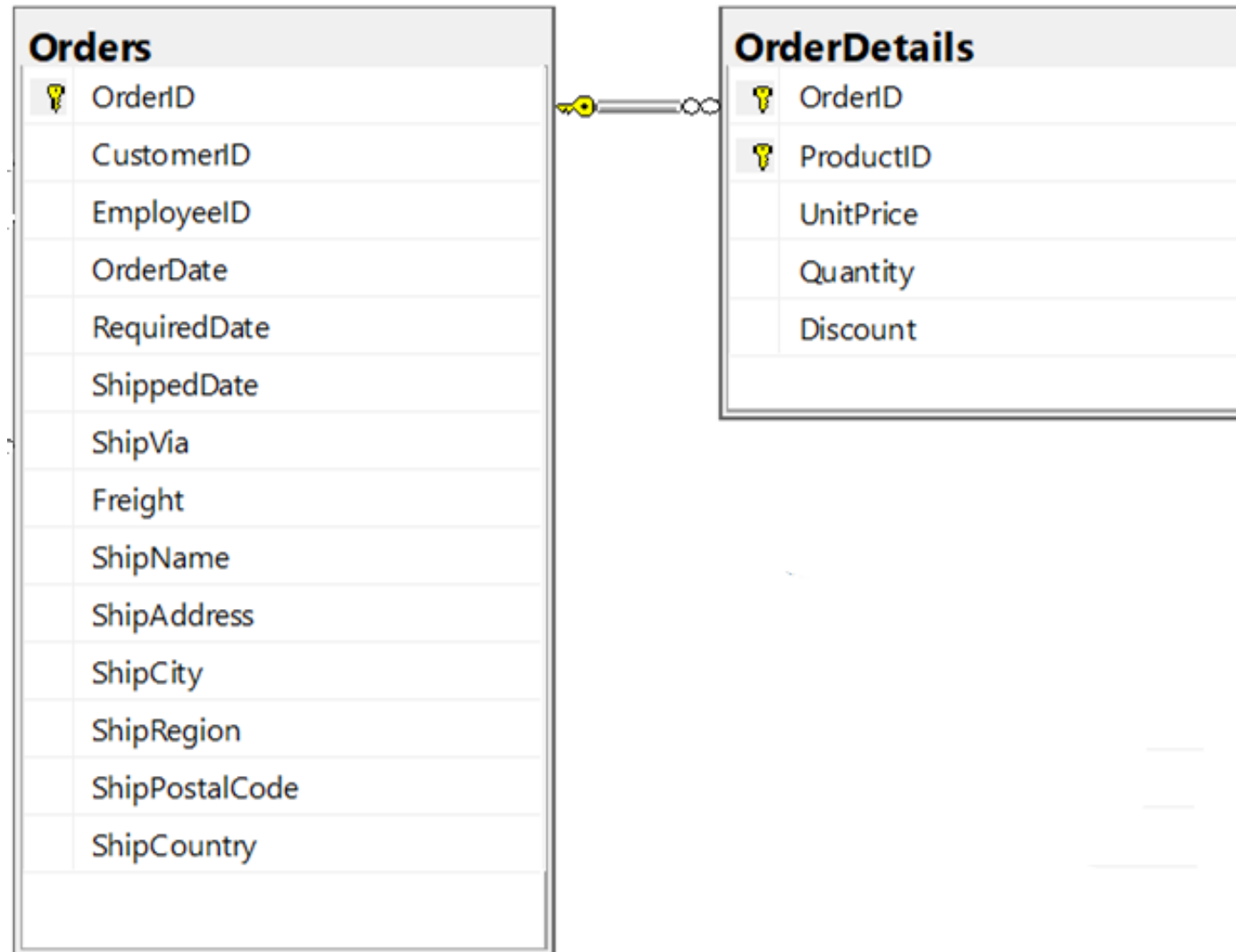
- Q4 What's the total revenue by year
  - Use Orders and OrderDetails datasets
  - When calculating revenue, ignore discount
- Steps?

# SAS Data Explorer & Data Studio – Q4

- Q4 What's the total revenue by year
  - Use Orders and OrderDetails datasets
  - When calculating revenue, ignore discount
- Steps
  - Load data
  - Join Orders and OrderDetails by OrderID
  - Calculate sales for each item in an order
  - Convert OrderDate to NUMERIC/DATE and extract year
  - Aggregate by year (how? CASL and FEDSQL; )

Ref. <https://blogs.sas.com/content/sgf/2018/03/16/sas-data-studio-code-transform-part-1/>

# Join Orders and OrderDetails



# SAS Visual Analytics – Q5

- Produce a bar plot
  - Revenue by country and year (together)
  - Revenue by country and employee (home work)
- Steps
  - in Data Studio
    - Join datasets...
    - Convert...
  - in Visual Analytics

# SAS Visual Statistics

- Get started on your own using these video tutorials
  - [Getting Started with SAS Visual Statistics](#) (7m)
  - [Building a Logistic Regression Model](#) (5m)
  - [Building a Clustering Model](#) (4m)
- Build a churning model
  - Use this dataset: [Telco Customer Churn](#)

# SAS Model Studio

- Get started on your own using these video tutorials
  - [Getting Started with Data Mining and Machine Learning Pipelines](#)
  - [Managing Variables](#)
  - [Feature Engineering](#)
  - [The Variable Selection](#)
  - [Imputing Missing Values](#)
- Another churning dataset for practice
  - [churn\\_telecom.sas7bdat](#) (in SAS data format)

Ref. <https://support.sas.com/en/software/visual-data-mining-and-machine-learning-support.html>