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Kognitio Architecture and SQL

Course Summary

Description

In this course, students will learn the Kognitio Architecture and Kognitio SQL starting at the most basic level and going to the most advanced level with many examples.

Objectives

By the end of this course, students will have a deeper knowledge and understanding of the Kognitio Architecture and Kognitio SQL and how to write it.

Topics

- Basic SQL Functions
- The WHERE Clause
- Distinct Vs. Group By
- Aggregation Function
- Join Functions
- Date Functions
- OLAP Functions
- Temporary Tables
- Sub-query Functions
- Strings
- Interrogating the Data
- View Functions
- Set Operators
- Data Manipulation Language (DML)
- Statistical Aggregate Functions

Audience

This course is designed for anyone who has a desire to learn Kognitio SQL from beginners to an advanced audience. This course is completely customizable by the client.

Prerequisites

There are no prerequisites for this course.

Duration

Two to three days

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Course Outline

I. Introduction to the Kognitio Architecture
- A. What is Parallel Processing?
- B. The Basics of a Single Computer
- C. Data in Memory is fast as Lightning
- D. Parallel Processing Of Data
- E. Kognitio is an In-Memory System
- F. Kognitio has Three Table Distribution Options
- G. Kognitio has Linear Scalability
- H. Nexus is Now Available for Kognitio

II. Kognitio Table Structures
- A. Kognitio has Three Table Distribution Options
- B. A Table that is distributed via a Round Robin Technique
- C. Round Robin Technique is the Default
- D. Random Distribution
- E. A Table that is distributed by Hash
- F. Tables that join are excellent candidates for Hashed Tables
- G. Hash Distribution
- H. A Table that is distributed by Hash by Multiple Columns
- I. The Reasons for a Multi-Column HASHED Distribution Key
- J. Creating a Table that is replicated across all Nodes
- K. Replicated Distribution
- L. The Concept is all about the Joins
- M. Kognitio allows you to create Images
- N. Creating a Table Image to place a Table in Memory
- O. Partitioning an Image
- P. Partitioning an Image View
- Q. CREATE OR REPLACE TABLE IMAGE
- R. DEFRAG TABLE IMAGE

III. Nexus for Kognitio
- A. Nexus is Available on the Cloud
- B. Nexus Queries Every Major System
- C. How to Use Nexus
- D. Why is Nexus Special? Visualization and Automatic SQL
- E. Why is Nexus Special? Cross-System Joins
- F. Why is Nexus Special? The Amazing Hub System
- G. Why is Nexus Special? Save Answer Sets as Tables
- H. Why is Nexus Special? Automated Data Movement
- I. Why is Nexus Special? Nexus makes the Servers Talk Directly
- J. What Makes Nexus Special? The Garden of Analysis
- K. The Garden of Analysis Grouping Sets Tab
- L. The Garden of Analysis - Grouping Sets Answer Sets
- M. The Garden of Analysis – Join Tab
- N. The Garden of Analysis – Charts/Graphs Tab
- O. The Garden of Analysis – Dynamic Charts Tab
- P. The Garden of Analysis – Dashboard Tab
- Q. Getting to the Super Join Builder
- R. The Super Join Builder is the First Entry in the Menu
- S. The Super Join Builder Shows Tables Visually
- T. Using the Add Join Button
- U. What to Do When No Tables are Joinable?
- V. Drag a Joinable Object into the Super Join Builder
- W. You Will See the Add Custom Join Window
- X. Defining the Join Columns
- Y. Your Tables Will Appear Together
- Z. Select the Columns You Want on the Report
- AA. Check out the SQL Tab to See the SQL that has been built
- BB. SQL Tab
- CC. Hit Execute to get the Report inside the Super Join Builder

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Course Outline (cont'd)

DD. The Report is delivered inside the Super Join Builder
EE. Let's Join Two Tables Again
FF. The Tabs of the Super Join Builder Philosophy – One Query
GG. The Tabs of the Super Join Builder – Objects Tab
HH. The Tabs of the Super Join Builder – Columns Tab)
II. The Tabs of the Super Join Builder – Sorting Tab
JJ. The Tabs of the Super Join Builder – Joins Tab
KK. The Tabs of the Super Join Builder – SQL Tab
LL. The Tabs of the Super Join Builder – Metadata Tab
MM. The Tabs of the Super Join Builder – Analytics Tab
NN. The Tabs of the SJB – Analytics Tab – OLAP Screen
OO. Getting a Simple CSUM in the Analytics Tab – OLAP
PP. Getting a Simple CSUM – The SQL Automatically Generated
QQ. The Answer Set of the CSUM
RR. Getting all of the OLAP functions in the Analytics Tab
SS. A Five Table Join Using the Menu
TT. The First Table is placed in the Super Join Builder
UU. Using the Add Join Cascading Menu
VV. All Five Tables Are In the Super Join Builder
WW. A Five Table Join Two Steps (Cube)
XX. Choose Cube with Columns from the Left Top of the Table
YY. All Tables are Cubed (Joined Together Instantly)
ZZ. Choose Cube and then Choose Your Columns
AAA. Create Cube - Tables Are Joined Without Columns Selected
BBB. Create Cube – Select the Columns You Want on the Report
CCC. How to join Kognitio, Oracle and SQL Server Tables
DDD. The Kognitio Table is now in the Super Join Builder
EEE. Drag the Joining Oracle Table to the Super Join Builder
FFF. Defining the Join Columns
GGG. Choose the Columns You Want on Your Report
HHH. Let's Add a SQL Server Table to our Teradata and Oracle Join
III. Defining the Join Columns
JJJ. All Three Tables are now in the Super Join Builder
KKK. Change the Hub and Run the Join on Oracle
LLL. Change the Hub and Run the Join on SQL Server
MMM. Simply Amazing - Change the Hub to the Garden of Analysis
NNN. Have the Answer Set Saved Automatically to Any System
OOO. Saving the Answer Set to an Oracle or SQL Server System
PPP. Saving the Answer Set to a Kognitio System
QQQ. Saving the Answer Set to a Teradata System

IV. The Basics of SQL

A. Introduction
B. Setting the Default Schema
C. SELECT * (All Columns) in a Table
D. Fully Qualifying a Database, Schema and Table
E. SELECT Specific Columns in a Table
F. Commas in the Front or Back?
G. Place your Commas in front for better Debugging Capabilities
H. Sort the Data with the ORDER BY Keyword
I. ORDER BY Defaults to Ascending
J. Use the Name or the Number in your ORDER BY Statement

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Course Outline (cont'd)

K. Two Examples of ORDER BY using Different Techniques
L. Changing the ORDER BY to Descending Order
M. NULL Values sort Last in Ascending Mode (Default)
N. NULL Values sort First in Descending Mode (DESC)
O. Major Sort vs. Minor Sorts
P. Multiple Sort Keys using Names vs. Numbers
Q. Sorts are Alphabetical, NOT Logical
R. Using A CASE Statement to Sort Logically
S. How to ALIAS a Column Name
T. A Missing Comma can by Mistake become an Alias
U. Comments using Double Dashes are Single Line Comments
V. Comments for Multi-Lines
W. Comments for Multi-Lines as Double Dashes per Line
X. A Great Technique for Comments to Look for SQL Errors

V. The WHERE Clause

A. The WHERE Clause limits Returning Rows
B. Double Quoted Aliases are for Reserved Words and Spaces
C. Character Data needs Single Quotes in the WHERE Clause
D. Character Data needs Single Quotes, but Numbers Don't
E. Comparisons against a Null Value
F. NULL means Unknown Data so Equal (=) won't return rows
G. Use IS NULL or IS NOT NULL when dealing with NULLs
H. NULL is UNKNOWN DATA so NOT Equal won't Work
I. Use IS NULL or IS NOT NULL when dealing with NULLs
J. Using Greater Than or Equal To (>=)
K. AND in the WHERE Clause
L. Troubleshooting AND
M. OR in the WHERE Clause
N. Troubleshooting Or
O. Troubleshooting Character Data
P. Using Different Columns in an AND Statement
Q. Quiz – How many rows will return?
R. Answer to Quiz – How many rows will return?
S. What is the Order of Precedence?
T. Using Parentheses to change the Order of Precedence
U. Using an IN List in place of OR
V. The IN List is an Excellent Technique
W. IN List vs. OR brings the same Results
X. The IN List Can Use Character Data
Y. Using a NOT IN List
Z. Null Values in a NOT IN List Bring Back No Rows
AA. A Technique for Handling Nulls with a NOT IN List
BB. BETWEEN is Inclusive
CC. NOT BETWEEN is Also Inclusive
DD. LIKE uses Wildcards Percent '%' and Underscore '_'
EE. LIKE command Underscore is Wildcard for one Character
FF. The ilike Command
GG. LIKE Command Works Differently on Char Vs Varchar
HH. Troubleshooting LIKE Command on Character Data
II. Introducing the TRIM Command
JJ. Introducing the RTRIM Command
KK. Quiz – What Data is Left Justified and what is Right?
LL. Numbers are Right Justified and Character Data is Left
MM. Answer – What Data is Left Justified and what is Right?
NN. An example of Data with Left and Right Justification
OO. A Visual of CHARACTER Data vs. VARCHAR Data

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Course Outline (cont'd)

PP. Escape Character in the LIKE Command changes Wildcards
QQ. Escape Characters Turn off Wildcards in the LIKE Command
RR. Quiz – Turn off that Wildcard
SS. ANSWER – To Find that Wildcard
TT. Using ILIKE with an AND Clause to Find Multiple Letters
UU. Using ILIKE with an OR Clause to Find Either Letters
VV. Keywords

VI. Distinct, Group By and TOP

A. The Distinct Command
B. Distinct vs. GROUP BY
C. Quiz – How many rows come back from the Distinct?
D. Answer – How many rows come back from the Distinct?
E. TOP Command
F. TOP Command with an ORDER BY Statement
G. Just Place the TOP n in front of any Query

VII. Aggregation

A. Quiz – You calculate the Answer Set in your own Mind
B. Answer – You calculate the Answer Set in your own Mind
C. Quiz – You calculate the Answer Set in your own Mind
D. Answer – You calculate the Answer Set in your own Mind
E. The 3 Rules of Aggregation
F. There are Five Aggregates
G. Quiz – How many rows come back?
H. Answer – How many rows come back?
I. Troubleshooting Aggregates
J. GROUP BY when Aggregates and Normal Columns Mix
K. GROUP BY delivers one row per Group
L. GROUP BY Dept_No or GROUP BY 1 the same thing
M. Limiting Rows and Improving Performance with WHERE
N. WHERE Clause in Aggregation limits unneeded Calculations
O. Keyword HAVING tests Aggregates after they are totaled
P. Keyword HAVING is like an Extra WHERE Clause for Totals
Q. Keyword HAVING tests Aggregates after they are totaled
R. Getting the Average Values per Column

VIII. Join Functions

A. A Two-Table Join Using Traditional Syntax
B. A two-table join using Non-ANSI Syntax with Table Alias
C. You Can Fully Qualify All Columns
D. A two-table join using ANSI Syntax
E. Both Queries have the same Results and Performance
F. Quiz – Can You Finish the Join Syntax?
G. Answer to Quiz – Can You Finish the Join Syntax?
H. Quiz – Can You Find the Error?
I. Answer to Quiz – Can You Find the Error?
J. Super Quiz – Can You Find the Difficult Error?
K. Answer to Super Quiz – Can You Find the Difficult Error?
L. Quiz – Which rows from both tables won't return?
M. Answer to Quiz – Which rows from both tables won't return?
N. LEFT OUTER JOIN
O. LEFT OUTER JOIN Results
P. RIGHT OUTER JOIN
Q. RIGHT OUTER JOIN Example and Results
R. FULL OUTER JOIN
S. FULL OUTER JOIN Results
T. Which Tables are the Left and which Tables are Right?

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Course Outline (cont'd)

Kognitio Architecture and SQL

Course Outline (cont'd)

P. TO_CHAR Example that is Amazing
Q. TO_CHAR Example to get Seconds since Midnight
R. TO_CHAR Example that is ahead of its Time
S. TO_DATE
T. TO_TIME
U. TO_TIMESTAMP
V. Using CASE and Extract to reformat Dates
W. Using CAST and SUBSTRING to reformat Dates
X. Using the DAYOFWEEK and the DECODE Function
Y. Intervals
Z. More Interval Examples
AA. TO_CHAR Details
BB. TO_CHAR Details Continued
CC. TO_CHAR, TO_DATE, TO_TIME and TO_TIMESTAMP

X. Sub-query Functions

A. An IN List is much like a Subquery
B. An IN List Never has Duplicates – Just like a Subquery
C. An IN List Ignores Duplicates
D. The Subquery
E. The Three Steps of How a Basic Subquery Works
F. These are Equivalent Queries
G. The Final Answer Set from the Subquery
H. Quiz- Answer the Difficult Question
I. Answer to Quiz- Answer the Difficult Question
J. Should you use a Subquery of a Join?
K. Quiz- Write the Subquery
L. Answer to Quiz- Write the Subquery
M. Quiz- Write the More Difficult Subquery
N. Answer to Quiz- Write the More Difficult Subquery
O. Quiz – Write the Extreme Subquery
P. Answer to Quiz – Write the Extreme Subquery
Q. Quiz- Write the Subquery with an Aggregate
R. Answer to Quiz- Write the Subquery with an Aggregate
S. Quiz- Write the Correlated Subquery
T. Answer to Quiz- Write the Correlated Subquery
U. The Basics of a Correlated Subquery
V. The Top Query always runs first in a Correlated Subquery
W. Correlated Subquery Example vs. a Join with a Derived Table
X. Quiz- A Second Chance to Write a Correlated Subquery
Y. Answer - A Second Chance to Write a Correlated Subquery
Z. Quiz- A Third Chance to Write a Correlated Subquery
AA. Answer - A Third Chance to Write a Correlated Subquery
BB. Quiz- Last Chance to Write a Correlated Subquery
CC. Answer – Last Chance to Write a Correlated Subquery
DD. Quiz – Write the Extreme Correlated Subquery
EE. Answer To Quiz – Write the Extreme Correlated Subquery
FF. Quiz- Write the NOT Subquery
GG. Answer to Quiz- Write the NOT Subquery
HH. Quiz- Write the Subquery using a WHERE Clause
II. Answer - Write the Subquery using a WHERE Clause
JJ. Quiz- Write the Subquery with Two Parameters
KK. Answer to Quiz- Write the Subquery with Two Parameters
LL. How the Double Parameter Subquery Works
MM. More on how the Double Parameter Subquery Works
NN. Quiz – Write the Triple Subquery

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Course Outline (cont'd)

Kognitio Architecture and SQL

Course Outline (cont'd)

SS. Quiz – What caused the COUNT OVER to Reset?
TT. Answer to Quiz – What caused the COUNT OVER to Reset?
UU. The MAX OVER Command
VV. MAX OVER with PARTITION BY Reset
WW. Troubleshooting MAX OVER
XX. The MIN OVER Command
YY. Troubleshooting MIN OVER
ZZ. Finding a Value of a Column in the Next Row with MIN
AAA. Quiz – Fill in the Blank
BBB. Answer – Fill in the Blank
CCC. Ordered Analytics OVER
DDD. CURRENT ROW AND UNBOUNDED FOLLOWING
EEE. Different Windowing Options
FFF. The CSUM for Each Product_Id and the Next Start Date
GGG. How Ntile Works
HHH. Ntile
III. Ntile Percentile
JJJ. Another Ntile example
KKK. Using Quantiles (Partitions of Four)
LLL. NTILE Using a Value of 10
MMM. NTILE - Tertiles with a PARTITION BY
NNN. FIRST_VALUE
OOO. FIRST_VALUE after Sorting by the Highest Value
PPP. FIRST_VALUE with Partitioning
QQQ. LAST_VALUE
RRR. Using LEAD
SSS. Using LEAD With and Offset of 2
TTT. LEAD
UUU. LEAD With Partitioning
VVV. Using LAG
WWW. Using LAG with an Offset of 2
XXX. LAG
YYY. LAG with Partitioning
ZZZ. SUM (SUM(n))

XII. Temporary Tables

A. There are Two Types of Temporary Tables
B. CREATING A Derived Table
C. Naming the Derived Table
D. Aliasing the Column Names in the Derived Table
E. Multiple Ways to Alias the Columns in a Derived Table
F. CREATING a Derived Table using the WITH Command
G. The Same Derived Query shown Three Different Ways
H. Most Derived Tables Are Used To Join To Other Tables
I. The Three Components of a Derived Table
J. Visualize This Derived Table
K. A Derived Table and CAST Statements
L. A Derived example Using the WITH Syntax
M. Quiz - Answer the Questions
N. Answer to Quiz - Answer the Questions
O. Clever Tricks on Aliasing Columns in a Derived Table
P. An example of Two Derived Tables in a Single Query
Q. MULTIPLE Derived Tables using the WITH Command
R. Finding the First Occurrence
S. Finding the Last Occurrence
T. Three Steps to Creating a Temporary Table
U. Two Versions of Creating a Temporary Table
V. ON COMMIT DELETE ROWS is the Kognitio Default
W. ON COMMIT DELETE ROWS
X. Important Temporary Table Information
Y. How to Use the ON COMMIT DELETE ROWS Option
Z. Create Table AS
AA. Creating a Temporary Table Using a CTAS that Joins Multiple Tables
BB. Create Table LIKE

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Course Outline (cont'd)

XIII. Strings

- A. The LENGTH Command Counts Characters
- B. The LENGTH Command – Spaces can Count too
- C. The LENGTH Command Counts Trailing Spaces
- D. The LENGTH Command and TRIM
- E. UPPER and LOWER Commands
- F. Using the LOWER Command
- G. Using the UPPER Command
- H. Non-Letters are Unaffected by UPPER and LOWER
- I. The CHARACTERS Command Counts Characters
- J. The CHARACTERS Command and Character Data
- K. The CHARACTERS and TRIM Commands
- L. LENGTH, CHARACTER_LENGTH and OCTET_LENGTH
- M. The TRIM Command trims both Leading and Trailing Spaces
- N. How to TRIM only the Trailing Spaces
- O. Concatenation
- P. A Visual of the TRIM Command Using Concatenation
- Q. Trim and Trailing is Case Sensitive
- R. How to TRIM Trailing Letters
- S. The SUBSTRING Command
- T. SUBSTRING and SUBSTR are equal, but use different syntax
- U. How SUBSTRING Works with NO ENDING POSITION
- V. Using SUBSTRING to move backwards
- W. How SUBSTRING Works with a Starting Position of -1
- X. How SUBSTRING Works with an Ending Position of 0
- Y. An example using SUBSTRING, TRIM and CHAR Together
- Z. The POSITION Command finds a Letters Position
- AA. Concatenation
- BB. Concatenation and SUBSTRING
- CC. Four Concatenations Together
- DD. Troubleshooting Concatenation

XIV. Interrogating the Data

- A. Quiz – What would the Answer be?
- B. Answer to Quiz – What would the Answer be?
- C. The NULLIF Command
- D. Quiz – Fill in the Answers for the NULLIF Command
- E. Answer– Fill in the Answers for the NULLIF Command
- F. The COALESCE Command – Fill In the Answers
- G. The COALESCE Answer Set
- H. The COALESCE Command
- I. The COALESCE Answer Set
- J. The COALESCE Quiz
- K. Answer - The COALESCE Quiz
- L. The Basics of CAST (Convert and Store)
- M. A CAST (Convert and Store) example
- N. Quiz - The Basics of the CASE Statements
- O. Answer to Quiz - The Basics of the CASE Statements
- P. Using an ELSE in the Case Statement
- Q. Using an ELSE as a Safety Net
- R. Rules for a Valued Case Statement
- S. Rules for a Searched Case Statement
- T. Valued Case Vs. A Searched Case
- U. Quiz - Valued Case Statement
- V. Answer - Valued Case Statement
- W. Quiz - Searched Case Statement
- X. Answer - Searched Case Statement
- Y. The CASE Challenge
- Z. The CASE Challenge Answer
- AA. Combining Searched Case and Valued Case

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Course Outline (cont'd)

Kognitio Architecture and SQL

Course Outline (cont'd)

S. CREATE OR REPLACE TABLE IMAGE
T. DEFRAG TABLE IMAGE
U. Not Null Constraints
V. Unique Constraints
W. Primary Key Constraints
X. Check Constraints
Y. Create Table AS WITH DATA or WITH NO DATA
Z. Another Version of Create Table AS
AA. CREATE Table FOR and FROM
BB. Create Table LIKE
CC. String Data Types
DD. Numeric Data Types
EE. Date, Time and Timestamp Data Types

XVIII. Data Manipulation Language (DML)

A. INSERT Syntax # 1
B. INSERT example with Syntax 1
C. INSERT Syntax # 2
D. INSERT example with Syntax 2
E. INSERT example with Syntax 3
F. INSERT/SELECT Command
G. INSERT/SELECT example using All Columns (*)
H. INSERT/SELECT example with Less Columns
I. Two UPDATE Examples
J. Subquery UPDATE Command Syntax
K. Example of Subquery UPDATE Command
L. Join UPDATE Command Syntax
M. Example of an UPDATE Join Command
N. DELETE and TRUNCATE Examples
O. To DELETE or to TRUNCATE
P. Subquery and Join DELETE Command Syntax
Q. Example of Subquery DELETE Command

XIX. Kognitio Explain

A. How to See an EXPLAIN Plan
B. Seeing an EXPLAIN Plan with Nexus
C. The Eight Rules to Reading an EXPLAIN Plan
D. Interpreting Keywords in an EXPLAIN Plan
E. Interpreting an EXPLAIN Plan
F. A Single Segment Retrieve – The Fastest Query
G. EXPLAIN With an ORDER BY Statement
H. EXPLAIN ANALYZE
I. EXPLAIN With a Range Query on a Table Partitioned By Day
J. EXPLAIN That Uses a B-Tree Index Scan
K. EXPLAIN That Uses a Bitmap Scan
L. EXPLAIN With a Simple Subquery
M. EXPLAIN With a Columnar Query
N. EXPLAIN With a Clustered Index
O. The Most Important Concept for Joins is the Distribution Key
P. EXPLAIN With Join that has to Move Data
Q. Changing the Join Query Changes the EXPLAIN Plan
R. Analyzing the Tables Structures for a 3-Table Join
S. An EXPLAIN For a 3-Table Join
T. Explain of a Derived Table vs. a Correlated Subquery
U. Explain of the Correlated Subquery
V. Explain of the Derived Table

XX. Statistical Aggregate Functions

A. The Stats Table
B. Numeric Manipulation Functions
C. Ceiling Gets the Smallest Integer Not Smaller Than X
D. Floor Finds the Largest Integer Not Greater Than X
E. The Round Function and Precision
F. The STDDEV_POP Function
G. A STDDEV_POP Example
H. The STDDEV_SAMP Function
I. A STDDEV_SAMP Example

The VAR_POP Function

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Course Outline (cont'd)

J. A VAR_POP Example
K. The VAR_SAMP Function
L. A VAR_SAMP Example
M. The CORR Function
N. A CORR Example
O. Another CORR Example so you can compare
P. The COVAR_POP Function
Q. A COVAR_POP Example
R. Another COVAR_POP Example so you can compare
S. The COVAR_SAMP Function
T. A COVAR_SAMP Example
U. Another COVAR_SAMP Example so you can compare
V. The REGR_INTERCEPT Function
W. A REGR_INTERCEPT Example
X. Another REGR_INTERCEPT Example so you can compare
Y. The REGR_SLOPE Function
Z. A REGR_SLOPE Example
AA. Another REGR_SLOPE Example so you can compare
BB. The REGR_AVGX Function
CC. A REGR_AVGX Example
DD. Another REGR_AVGX Example so you can compare
EE. The REGR_AVGY Function
FF. A REGR_AVGY Example
GG. Another COVAR_POP Example so you can compare
HH. The REGR_COUNT Function
II. A REGR_COUNT Example
JJ. The REGR_R2 Function
KK. A REGR_R2 Example
LL. The REGR_SXX Function
MM. A REGR_SXX Example
NN. The REGR_SXY Function
OO. A REGR_SXY Example
PP. The REGR_SYY Function
QQ. A REGR_SYY Example
RR. Using GROUP BY