

Q&A with the macro maven: is sql our lingua franca?

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Abstract

description: SAS® software provides an implementation of Structured Query Language (sql). Usage of the sql procedure creates an opportunity for the user to learn database terminology and consider how to address their programming problems and reporting as a matter of the design of the data structure.

purpose: The purpose of this Q&A dialogue is to review the suitability of sql as a common language for users and programmers.

Its benefits include a knowledge of design of data structure for ease of reporting as well as the ability to research the SAS global symbol table.

The dialogue is an exposition of how we learn both natural and artificial languages, and how we use them to communicate.

audience: all levels

keywords: data structure: primary key (unique), foreign key (few: category), fact (numeric, summable); procedures: contents, sql; global symbol table

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Introduction

audience introduction

- music skill
 - education: degree type, major
 - languages: natural: speak second
artificial: computer language
 - SAS years experience
job category
industry category
-

Neuro-Linguistic Programming: NLP

<u>NLP deconstructors</u>	<u>psychotherapists</u>
Richard Bandler	Milton Erickson
Robert Dilts	Fritz Perls
John Grinder	Virginia Satir

The process of observing, analyzing, distilling, decoding, and installing the best mental software is called

modeling

reprinted from White and Arthur, *Your Seventh Sense, How to Think Like a Comedian*

Dilts: NLP pyramid, 1



Dilts: NLP pyramid, 2

- vision your resume
 - identity role
 - values reusable
 - skills quality, testing
 - behavior thorough
 - environment quiet!
-

Learning natural languages

categories of languages	• pidgin	synthesis of two languages trade: nouns, counting adults learn
	• creole	stable, common, daily use children learn
	• natural language	culture: writing, literature
	• nation	language with an army
<hr/>		
steps in learning a second language	• introduction	hello, goodbye
	• counting	time, dates
	• directions	right, left, north south east west
	• food, drink	protein, alcohol
	• health	pain, parts of body
<hr/>		

Learning computer languages

learning any computer language	• variables	local, global, scope
	• conditions	if, case, select, where
	• loops	for i = 1 to ...
	• "functions"	f(x), processes, procedures
	• syntax	"how to write that idea?"
<hr/>		
hierarchy of program types	• modules	call routines, subroutines
	• routines	calls subroutines
	• subroutines	do work: create output
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Learning SAS

learning SAS, my story

- data: read column-delimited text
 - procedures: contents format freq print
 sort sql summary tabulate
 - macros: variables and definitions, option sasautos
 - programming:
 - operating systems: DOS, MVS
 - %include, autoexec, sasv9.cfg
 - sql, database theory,
 - scl
 - cardinality ratio and type
-

program: data structure + algorithm

```
data set
  (label = "...")          ;
  attribute                ;
  array                   ;
  if 0 then set ...       ;
  drop _*                 ;
do until                   (end_of_file);
  set lib.data   end = end_of_file ;
*...;
  if ... then output;
end;
stop;
run;
```

macro template

```
%macro xyz(data = sashelp.class
  ,...
  ,testing = 0
  )/des = '<UNC>\sas-macros\xyz.sas'
%let testing = %eval(not(&testing eq 0)
  or %sysfunc(getoption(mprint)) eq MPRINT
  );
%if &testing %then %do;
  proc sql; describe table &syslast; quit;
  %end;
%mend xyz;
```

Database theory

database vocabulary

- keys:
 - primary row-id, row-number
 - foreign discrete
 - facts: continuous
count, measurement; summable
-

database theory: Codd's 12 rules

- Rule
- 0 The foundation rule:
 - 1 The information rule:
 - 2 The guaranteed access rule:
 - 3 Systematic treatment of null values:
 - 4 Dynamic online catalog based on the relational model:
 - 5 The comprehensive data sublanguage rule:
 - 6 The view updating rule:
 - 7 High-level insert, update, and delete:
 - 8 Physical data independence:
 - 9 Logical data independence:
 - 10 Integrity independence:
 - 11 Distribution independence:
 - 12 The nonsubversion rule:
-

cardinality ratios and types

example output for sashelp.class, n-obs = 19, n-vars = 5

mem_ name	var num	card_ type	card_ ratio	n_ levels	name	type	length
class	1	.unique	1	19	Name	c	8
class	2	few	0.1052	2	Sex	c	1
class	3	few	0.3157	6	Age	n	8
class	4	many	0.8947	17	Height	n	8
class	5	many	0.7894	15	Weight	n	8

Quality assurance / control

qa/qc personnel

date	author	cited	idea
1890	Pareto	by Juran	80/20 rule
1920	Shewhart	by Deming	PDCA, process control chart
1950s	Deming	Shewhart	PDSA, quality circles
1950s	Juran	Pareto	quality management
1950s	Ishikawa	Deming, Juran	fishbone diagram
1950s	Crosby		Zero Defects, TQM

Phil Crosby: Zero Defects

- The definition of quality is conformance to requirements (requirements meaning both the product and the customer's requirements)
- The system of quality is prevention
- The performance standard is zero defects (relative to requirements)
- The measurement of quality is the price of nonconformance

Suggested reading

cardinality ratio Fehd, "Calculating Cardinality Ratio in Two Steps"

predecessors Fehd, "Advanced Programming Concepts: History of the List Processing and Cardinality Ratio Memes"

languages

computer : https://en.wikipedia.org/wiki/Computer_language

creole : <https://en.wikipedia.org/wiki/Creole>

lingua-franca : https://en.wikipedia.org/wiki/Lingua_franca

natural : https://en.wikipedia.org/wiki/Natural_language

pidgin : <https://en.wikipedia.org/wiki/Pidgin>

database Agosta, *The Essential Guide to Data Warehousing*

Codd: <https://database.guide/codds-12-rules/>
Kimball and Ross, *The Data Warehouse Toolkit, The Definitive Guide to Dimensional Modeling, Third Edition*

learning sql Fehd, "How To Use proc SQL select into for List Processing"

Hermansen, "Ten Good Reasons to Learn SAS Software's SQL Procedure"
Lafler, *PROC SQL: Beyond the Basics Using SAS(R), Third Edition*

NLP White and Arthur, *Your Seventh Sense, How to Think Like a Comedian*
Dilts, *Dilts' Pyramid*

persons

Pareto : 1848–1923; Pareto principle: for many outcomes, roughly 80% of consequences come from 20% of causes. Other names: the 80/20 rule, law of vital few, or principle of factor sparsity; Pareto chart cited in TQM and Six Sigma.

https://en.wikipedia.org/wiki/Vilfredo_Pareto

- Shewhart : 1891–1967; father of statistical quality control; PDCA: Plan, Do, Check, Act; cited by Deming
https://en.wikipedia.org/wiki/Walter_A._Shewhart
 process-behavior charts
https://en.wikipedia.org/wiki/Control_chart
- Shannon : 1916–2001; father of information theory
https://en.wikipedia.org/wiki/Claude_Shannon
- Tufte : 1942–; book, 1983: The Visual Display of Quantitative Information
https://en.wikipedia.org/wiki/Edward_Tufte
<https://www.edwardtufte.com/tufte/>
- Tukey : 1915–2000; book, 1977: Exploratory Data Analysis
https://en.wikipedia.org/wiki/John_Tukey
- Deming : 1900–1993; cited Shewhart on statistical process control; 1950s: described quality circles, translated in Japan by Ishikawa; 1983: see "14 points" in book: Out of the Crisis; 1985: Total Quality Management (TQM) based on Deming's ideas; 1993: Plan-Do-Study-Act (PDSA) cycle, successor of Shewhart's PDCA
https://en.wikipedia.org/wiki/W._Edwards_Deming
https://en.wikipedia.org/wiki/Quality_circle
- Juran : 1904–2008; 1941: cited Pareto; Juran trilogy: quality planning, quality control, and quality improvement; 1950s: lectured in Japan on quality management https://en.wikipedia.org/wiki/Joseph_M._Juran
- Ishikawa : 1915–1989; refined Deming's quality circles, fishbone diagram; 1950s: translated Deming and Juran
https://en.wikipedia.org/wiki/Kaoru_Ishikawa
 continual improvement (kaizen)
https://en.wikipedia.org/wiki/Continual_improvement_process
 fishbone diagram:
https://en.wikipedia.org/wiki/Ishikawa_diagram
- Crosby : 1926–2001; Zero Defects;
 quote: "Get things done right the first time"; book: Quality is Free
https://en.wikipedia.org/wiki/Philip_B._Crosby
- qa/qc
- 6 σ : Six Sigma https://en.wikipedia.org/wiki/Six_Sigma
- Kaizen : <https://en.wikipedia.org/wiki/Kaizen>
- TQM : Total Quality Management
https://en.wikipedia.org/wiki/Total_quality_management
- ZD : Zero Defects https://en.wikipedia.org/wiki/Zero_Defects
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Conclusion

SQL and database theory solve many of the problems I have solved during my career. Most discussions of programming come back to two issues: (lack of) data structure, and clarity of algorithm.

I hope that this paper has provided an historical overview of issues related to quality of programming using SAS software.

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