



## “The Context Model: A graph database model”

**Nicolas Spyratos**

Prof. Emeritus,  
University Paris-Saclay, France



### ΠΕΡΙΛΗΨΗ – ABSTRACT

We propose a novel database model whose basic structure is a labeled, directed, acyclic graph with a single root, in which the nodes represent the data sets of an application, and the edges represent functional relationships among the data sets. We call such a graph an application context or simply context. The query language of a context consists of two types of queries, traversal queries and analytic queries. Both types of queries are defined using a simple functional algebra whose operations are functional restriction, composition of functions, pairing of functions and Cartesian product. Roughly speaking, traversal queries parallel relational algebra queries, whereas analytic queries parallel SQL Group-by queries. In other words, in our model, traversal queries and analytic queries are both defined in the same formal framework - in contrast to the relational model, where analytic queries are defined outside the relational algebra. Therefore, a distinctive feature of our model is that it is a model for data management and data analytics within the same formal framework. We demonstrate the expressive power of our model by showing: (a) how a relational database can be defined as a view over a context, with the context playing the role of an underlying semantic layer; (b) how an analytic query over a context can be rewritten at two orthogonal levels: at the level of the traversal queries that do the grouping and measuring, and at the level of the analytic query itself; and (c) how a context can be used as a user-friendly interface for querying relations and analyzing relational data.

*Nicolas Spyratos is professor emeritus of Computer Science at the University of Paris South, Orsay Center, at the Informatics Research Laboratory (LRI). Educated in Greece, Canada and France, he holds a Diploma in Electrical Engineering from the National Technical University of Athens (Greece), a M.Sc. from the University of Ottawa (Canada), Ph.D. from Carleton University (Canada), and Thèse d'Etat from the University of Paris South (France).*

*Prior to 1983, he has worked for IBM in Greece, for Bell-Northern Research and the Federal Department of Communications in Canada, and for INRIA, the University of Orleans and the National Research Council (CNRS) in France.*

*He is the author of over 150 publications in international conferences and journals and his current research interests include conceptual modelling, big data analytics, digital libraries and information personalization. He has supervised the work of 17 PhD students in these areas. He has also served on the program committee of over 60 international conferences. He has participated in several national, European and international research projects and has served as evaluator for the NSF and the European commission.*

**Τρίτη 25 Ιουνίου 2024**

**12:00 -13:00**

**Αίθουσα Σεμιναρίων**