

# Dr. Gabriela Beatriz Arévalo

## Curriculum Vitae

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### 1 Administrative Information

Home Address :

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Born at Jujuy (Argentina) September 14 1973

Argentine nationality, single.

Languages : Spanish (Mother Language), English (Level of Proficiency of English), French (Good Knowledge : spoken, read and written) and German (limited knowledge).

### 2 Professional Experience

**Feb 2005 –...** Postdoctoral researcher at the University of Berne in the Software Composition Group.

**October 2000 – January 2005** Ph.D. student at the University of Berne in the Software Composition Group.

Topic : High-Level Views in Object-Oriented Systems using Formal Concept Analysis

### 3 Education and Titles

**October 2000 – January 2005** **Ph.D. in Computer Science** in the University of Bern in the “Software Composition Group”.

*Title* : “High-Level Views in Object-Oriented Systems using Formal Concept Analysis”

*Abstract* :

*Within object-oriented systems there are different meaningful dependencies between different objects. These dependencies reveal contracts, collaborations and relationships between classes, methods, packages and any*

*development unit in the systems. In most of the cases, these dependencies are not explicit in the code. This problem is due to inadequate or out-of-date documentation and mechanisms such as dynamic binding, inheritance and polymorphism that obscure the presence of existing dependencies. These dependencies play an important part in implicit contracts between the various software artifacts of the system. It is therefore essential that a developer, who has to make changes or extensions to an object-oriented system, understands the dependencies among the classes. Lack of understanding increases the risk that seemingly innocuous changes break the implicit existing contracts in the system. In short, implicit, undocumented dependencies lead to fragile systems that are difficult to extend or modify correctly. In this thesis we develop an approach - based on a methodology and a tool support - to recover this implicit information and generate high-level views of a system at different abstraction levels, using a formal clustering technique called Formal Concept Analysis (FCA). With these views, we help to build the first mental model of a system. Thus the implicit or lost information is made explicit and we are able to find uses of coding styles, possible bottlenecks and weakpoints of a system, identify eventual contracts between the entities, patterns based on the dependencies and - if possible - propose possible solutions to correct problems in the code. With this approach we also evaluate which are the advantages and disadvantages of using a clustering technique in software reverse engineering.*

*Fundings* : Swiss National Science Foundation in the context of the projects "Tools and Techniques for Decomposing and Composing Software" (NFS Project 2000-067855.02) and PECOS Project (ES-PRIT Project IST-20398).

*Defense* : January 14th, 2005.

*Committee* :

Prof. Horst Bunke	Université de Berne, (chair)
Prof. Marianne Huchard	Université de Montpellier II (reviewer)
Prof. Giuliano Antoniol	Université de Sannio
Prof. Oscar Nierstrasz	Université de Berne (supervisor, reviewer)
Prof. Stéphane Ducasse	Université de Berne (supervisor, reviewer)

*Grade* : 6 (best possible)

**Septembre 1999 – Septembre 2000** **Master of Sciences** in Computer Sciences within the context of EMOOSE program (European Master in Object-Oriented Software Engineering) in Ecole des Mines de Nantes (France) and Vrije Universiteit Brussel (Belgium).

*Supervisor* : Prof. Isabelle Borne

*Title* : Object-Oriented Architectural Description of Frameworks

*Abstract* :

*The existing formalisms to represent software architectures fail in providing a clear semantics and only give an intuitive picture of the system as a whole. The thesis goals were : starting from several object oriented frameworks, as a first step, to study and compare the various levels and expressive power of two formal approaches, such as architectural patterns and Wright -an architectural description language. Next we study the possible complementarity of these approaches, and also evaluate the flexibility of the descriptions in order to be able to take evolution aspects into account. The final goal was to propose a complete description of a framework based on the previous results.*

*Defense* : August 28th, 2000.

*Committee* :

Prof. Theo D'Hondt	Vrije Universiteit Brussels
Dr. Tom Mens	Vrije Universiteit Brussels
Prof. Viviane Jonckers	Vrije Universiteit Brussels
Prof. Pierre Cointe	Ecole des Mines de Nantes
Prof. Jacques Noye	Ecole des Mines de Nantes

Grade : 15/20

**1992 – March 1999** **Licentiate** in Computer Science in Universidad Nacional de La Plata (Buenos Aires, Argentina) in Laboratorio de Investigación y Formación en Informática Avanzada (LIFIA).

Supervisor : Dr. Silvia Gordillo

Title : G.I.S. + Oceans = A strange combination (in Spanish)

Abstract :

*Although the oceanographic data are geographically referenced, the locations and boundaries are more unclear than in the terrestrial environments, where there are a few control points with known coordinates. The thesis goals were the study of domain and design of phenomena related to sedimentation and continental growing which provoke changes in the ocean depths, using object oriented methodology, such as UML and patterns.*

Defense : March 19th, 1999

Committee :

Lic. Marcelo Naiouf      Universidad Nacional de La Plata, Argentina

Lic. Luciano Lorenzon    Universidad Nacional de La Plata, Argentina

Prof. Julio Coccaro      Universidad Nacional de La Plata, Argentina

Grade : 9/10.

## 4 Research Community Implications

### Visited Labs

**August 03 (1 week)** Hosted by the Software Engineering Group led by Prof. Houari Sahraoui of the University of Montreal

### Reviewer

- International Conferences : European Conference for Object-Oriented Programming (ECOOP'01, '02, '03, '04, '05), Object-Oriented Programming Systems, Languages and Applications (OOPSLA'01, '02)), and LMO Langages et Modèles à Objets (LMO'02, '03, '04), European Symposium on Programming (ESOP '03), International Conference on Modeling Language (UML '04, '05).
- Workshops : Managing Specialization and Generalization Hierarchies (MASPEGHI '04) in ECOOP 2004 in Helsinki (Finland), International Workshop on Principles of Software Evolution (IWPSE '04).
- Journals : IEEE Transactions on Software Engineering (TSE) - Special Issue WCRE '04.

### Co-organisor of

- MASPEGHI '04 Workshop (Managing Specialization and Generalization Hierarchies) in ECOOP '04 in Helsinki (Finland).
- Co-responsible of "ESUG Initiative Program" (Dissemination program of Smalltalk/Squeak in academic world)

## 5 Teaching

The following lectures were developed in Facultad de Ciencias Exactas (Universidad Nacional de La Plata) during my University studies :

- Subject : **Functional Programming** (2nd Year)  
Duration : July '95 - December '96  
Students : 25  
Workload : 9 hours per week  
Tasks : Exercises.
  
- **Seminar about Languages (Formal Languages and Finite Automata)** (2nd Year)  
Duration : July '94 - December '96  
Students : 15  
Workload : 9 hours per week  
Tasks : Exercises.
  
- **Mathematics (Lecture to enter in the University)** (1st Year)  
Duration : February '96 - April '96  
Students : 45  
Workload : 30 hours per week  
Tasks : Exercises.
  
- **Databases** (4th Year)  
Duration : March '96 - August '99  
Students : 40  
Workload : 9 hours per week  
Tasks : Exercises, Exams.
  
- **Object-Oriented Databases** (4th Year)  
Duration : July '97 - December '97  
Students : 40  
Workload : 9 hours per week  
Tasks : Exercises, Exams.
  
- **Logic** (4th Year)  
Duration : July '97 - December '97  
Students : 40  
Workload : 9 hours per week  
Tasks : Exercises.

The following lecture was developed in the Ecole des Mines de Nantes during my master's studies in the context of EMOOSE program.

- **Databases** (2nd Year)  
Duration : September '99 - March '00  
Students : 40  
Workload : 2 hours per week  
Tasks : Exercises, Exams.

The following lecture was developed in the University of Bern during my PhD.

- **Programming Languages** (4th Year)  
Duration : March '02 - ...  
Students : 30  
Workload : 4 hours per week  
Tasks : Exercises, Exams.

## 6 Supervision

**Master's Thesis.** A master thesis has a average length of one year and half in our team.

- 02-03** Co-Supervision with Oscar Nierstrasz of Frank Buchli's Master Thesis (University of Berne).  
*Title* : Detecting Software Patterns using Formal Concept Analysis.

## 7 References

- Prof. Oscar Nierstrasz  
Leader of Software Composition Group  
Institut für Informatik und angewandte Mathematik  
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- Prof. Stéphane Ducasse  
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- Prof. Roel Wuyts  
Leader of Laboratory for Software Composition and Decomposition  
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– Prof. Giuliano Antoniol  
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– Prof. Marianne Huchard  
Leader of the research group D’OC (Données Objets Connaissances)  
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## Publications

### Publications in International Conferences

- Gabriela Arévalo, Stéphane Ducasse, and Oscar Nierstrasz. Discovering Unanticipated Dependency Schemas in Class Hierarchies. In *Proceedings of CSMR '05 (9th European Conference on Software Maintenance and Reengineering)*, pages 62–71. IEEE Computer Society Press, March 2005.
- Gabriela Arévalo, Stéphane Ducasse, and Oscar Nierstrasz. Lessons Learned in Applying Formal Concept Analysis. In *Proceedings of ICFCA '05 (3rd International Conference on Formal Concept Analysis)*, volume 3403 of *LNAI (Lecture Notes in Artificial Intelligence)*, pages 95–112. Springer Verlag, February 2005.
- Gabriela Arévalo, Frank Buchli, and Oscar Nierstrasz. Detecting Implicit Collaboration Patterns. In *Proceedings of WCRE '04 (11th Working Conference on Reverse Engineering)*, pages 122–131. IEEE Computer Society Press, November 2004.
- Gabriela Arévalo, Stéphane Ducasse, and Oscar Nierstrasz. X-Ray Views : Understanding the Internals of Classes. In *Proceedings of ASE '03 (18th Conference on Automated Software Engineering)*, pages 267–270. IEEE Computer Society Press, October 2003. Short paper.
- Gabriela Arévalo. Understanding Behavioral Dependencies in Class Hierarchies using Concept Analysis. In *Proceedings of LMO '03 (Langages et Modeles à Objets)*, pages 47–59. Hermes, Paris, January 2003.
- Gabriela Arévalo and Isabelle Borne. Architectural Description of Object Oriented Frameworks. In *Proceedings of LMO '01 (Langages et Modeles à Objets)*. Hermes, Paris, January 2001.
- Oscar Nierstrasz, Gabriela Arévalo, Stéphane Ducasse, Roel Wuyts, Andrew Black, Peter Müller, Christian Zeidler, Thomas Gensler, and Reinier van den Born. A component model for field devices. In *Proceedings First International IFIP/ACM Working Conference on Component Deployment*, pages 200–209, Berlin, Germany, June 2002. ACM.

### Workshop Papers

- Gabriela Arévalo, Stéphane Ducasse, and Oscar Nierstrasz. Understanding Classes using X-Ray Views. In *Proceedings of 2nd International Workshop on MASPEGHI 2003 (ASE 2003)*, pages 9–18. CRIM - University of Montreal (Canada), October 2003.
- Gabriela Arévalo. X-Ray Views on a Class using Concept Analysis. In *Proceedings of WOOR 2003 (4th International Workshop on Object-Oriented Reengineering)*, pages 76–80. University of Antwerp, July 2003.
- Gabriela Arévalo and Tom Mens. Analysing Object Oriented Framework Reuse using Concept Analysis. In Jean-Michel Bruel and Zohra Bellahsene, editors, *Advances in Object-oriented Information Systems : OOIS 2002 Workshops*, pages 53–63. Springer Verlag, September 2002.
- Gabriela Arévalo and Tom Mens. Analysing Object Oriented Application Frameworks using Concept Analysis. In Andrew Black, Erik Ernst, Peter Grogono, and Markky Sakkinen, editors, *ECOOP 2002 : Proceedings of the Inheritance Workshop*, pages 3–9. University of Jyväskylä, June 2002.
- Peng Liang, Gabriela Arévalo, Stéphane Ducasse, Michele Lanza, Nathanael Schärli, Roel Wuyts, and Oscar Nierstrasz. Applying rma for scheduling field device components. In *ECOOP 2002 Workshop Reader*, 2002.

- Michael Winter, Thomas Genßler, Alexander Christoph, Oscar Nierstrasz, Stéphane Ducasse, Roel Wuyts, Gabriela Arévalo, Peter Müller, Christian Stich, and Bastiaan Schönhage. Components for embedded software — the pecos approach. In *Proc. Second International Workshop on Composition Languages*, 2002. In conjunction with 16th European Conference on Object-Oriented Programming (ECOOP) Malaga, Spain, June 11, 2002.
- Roel Wuyts, Stéphane Ducasse, and Gabriela Arévalo. Applying experiences with declarative codifications of software architectures on cod. In *Ecoop 6th International Workshop on Component-Oriented Programming*, 2001.

### **Workshop Reports**

- Gabriela Arévalo, Andrew P. Black, Yania Crespo, Michel Dao, Erik Ernst, Peter Grogono, Marianne Huchard, and Markku Sakkinen. The inheritance workshop. In *ECOOP Workshops*, pages 117–134, 2002.
- Philippe Lahire, Gabriela Arévalo, Hernán Astudillo, Andrew P. Black, Erik Ernst, Marianne Huchard, T. Oplustil, Markku Sakkinen, and Petko Valtchev. Maspeggi 2004 mechanisms for specialization, generalization and inheritance. In *ECOOP Workshops*, pages 101–117, 2004.

### **Ph.D. Thesis**

- Gabriela Arévalo. *High Level Views in Object Oriented Systems using Formal Concept Analysis*. PhD thesis, University of Berne, January 2005.

### **Master Report**

- Gabriela Arévalo. Object-Oriented Architectural Description of Frameworks. Master’s thesis, Ecole des Mines de Nantes, September 2000.

### **Diploma Report**

- Gabriela Arévalo. G.I.S. + Oceans = A Strange Combination. Diploma Thesis, University of La Plata, March 1999. in Spanish.