Curriculum Vitae

Name: Z. Dilsun Kırlı **Date of Birth:** 3. October. 1973

Address: Laboratory for Foundations of Computer Science
Division of Informatics, The University of Edinburgh
JCMB, Rm 3604, The King's Buildings, Mayfield Road
Edinburgh EH9 3JZ, Scotland UK
Email: zdk@dcs.ed.ac.uk
Tel: +44 131 650 4889 Fax:+44 131 667 72 09
WWW page: `http://www.dcs.ed.ac.uk/~zdk`

Research Interests

My research interests encompass the areas of programming languages, static program analysis and mobile computation in large scale distributed networks. Recently, I have focused on foundational aspects of languages which include support for code mobility and security as a design objective. In particular, I am interested in the use of static type systems as a means for estimating the dynamic behaviour of programs and enforcing properties concerning the integrity of systems and secure information flow.

Functional programming languages of the ML family such as Standard ML, Concurrent ML and Facile have provided the framework of my research so far. These languages are known for their expressive power due to higher-order programming constructs, well-definedness of their computational model and the presence of sophisticated type systems which provide security through type safety in the contexts of sequential and concurrent computation. My doctoral research was motivated by the idea that adopting the principles of functional computation can give rise to well-founded and secure mobile code languages which also enable rigorous reasoning about programs.

As a departure point in the exploration of functional mobile computation, I defined a simple language, Mobile-λ, which integrates a functional core with channel-based communication. In this language functions are first class values which can be transmitted between different sites in a system. This leads to a natural support for code mobility since functions are code containing computational objects. My primary interest has been to exploit the methodology of annotated type and effect systems to expose and analyse the behaviour of Mobile-λ programs. Static estimation of potentially mobile functions and distributed call-tracking analysis are among the problems which I considered in the earlier stages of my research. The information obtained by such static analyses can be put to use in compiler-optimisations.

More recently, I have been investigating notions of secure information flow for functional mobile computation in multi-user systems where users and data may be of different trust and sensitivity levels. This involves adapting relatively well-established notions such as non-interference to the context of functional mobile computation and investigating novel notions which are particularly relevant to mobile functions. My work on the language Confined-λ introduces a confidentiality property called "confinement in a mobility region". By using Confined-λ a user can create a confidential piece of information and declare the subsystem in which this information is allowed to flow freely. Such a subsystem is called a mobility region and is declared by providing the required annotations. The type system of the language makes use of these annotations to guarantee that well-typed programs cannot leak the confidential information to the parties outside the designated mobility region.

In general, my work requires an understanding of theoretical models of functional and mobile computation as well as an awareness of the practical challenges of computing in modern distributed systems. In the near future, I intend to work on transforming the meta-language nature of the languages I have designed to arrive at realistic intermediate languages such as those employed within state-of-the-art compilers. I am also interested in exploring the connections of my work with object oriented mobile code languages which take objects rather than functions as basic mobile units.

Education

- 1992-1996 BSc in Computer Engineering, METU, Ankara, Turkey
- 1996-1997 MSc in Computer Science, The University of Edinburgh, UK
- Since 1997 Working towards a PhD, The University of Edinburgh, UK
Anticipated finishing date November 6, 2001

Teaching Experience

- 1997-1999 Tutor for Computer Science 2, The University of Edinburgh
- 1999-2000 Tutor for Computer Science 1, The University of Edinburgh
- 2000-2001 Lecturer for Computer Science 4 and MSc in Informatics,
The University of Edinburgh

The content of the courses I tutored on can be summarised as introducing basic concepts of computer science and the software engineering process to students. This included providing them with programming skills in Java and Standard ML, teaching logic and techniques for reasoning about algorithms and programs. Recently, I have been teaching the Distributed Systems Module which covers the major design issues of distributed systems regarding communication, transparency, fault-tolerance and security.

Research Experience

I am employed as a research associate on the project "Type Systems for Resource-bounded Programming and Compilation " funded by the Engineering and Physical Sciences Research Council in the UK.

Publications

Monograph

My PhD thesis entitled "Functional Mobile Computation", which is currently under preparation, has been accepted for publication as a monograph by Kluwer Academic Publishers. It will appear in a forthcoming series called Advances in Information Security.

Papers

- D. Kırlı. Confined mobile functions. To appear in *Proceedings of the 14th Computer Security Foundations Workshop*, Cape Breton, Nova Scotia, Canada, June 2001.
- D. Kırlı. Secure information flow for mobile functions. In *Proceedings of the Workshop on Issues in the Theory of Security(WITS '00)*, Geneva, July 2000.
- C. Walton, D. Kırlı, and S. Gilmore. An abstract machine model of dynamic module replacement. In *Future Generation Computer Systems*, Volume 16, Issue 7, page 793-808, May 2000.
- D. Kırlı. A polymorphic type and effect system for detecting mobile functions. Technical Report ECS-LFCS-99-413, Laboratory for Foundations of Computer Science, Division of Informatics, The University of Edinburgh, 1999.
- D. Kırlı. A survey on functions, concurrency, distribution and mobility. In *Preliminary Proceedings of the 1st Scottish Functional Programming Workshop*, Stirling, UK, September 1999.
- D. Kırlı. A static type system for detecting potentially transmissible functions. In P. Sewell and J. Vitek, editors, *Proceedings of the 5th Mobile Object Systems Workshop: Programming Languages for Wide Area Networks*, Lisbon, Portugal, June 1999.
- S. Gilmore, D. Kırlı, and C. Walton. Dynamic ML without dynamic types. Technical Report ECS-LFCS-97-378, Laboratory for Foundations of Computer Science, Department of Computer Science, The University of Edinburgh, 1998.
- D. Kirli. A test case assessor for ML. MSc.Thesis. The University of Edinburgh, 1997

Work in Progress

- D. Kırlı. Distributed call-tracking analysis for mobile functions.