Report on Visit by Jost Berthold as SICSA Distinguished Visitor (11.3.-22.3.2013):

Jost Berthold, assistant professor at the Department of Computer Science (DIKU), University of Copenhagen, visited several SICSA universities from March 11th to 22nd. He was primarily based in the School for Mathematical and Computer Sciences, Heriot-Watt University. The focus of the joint work during this period was on our parallel Haskell runtime-systems, exchanging detailed expertise on latest developments and planning future directions in order to share a significant part of the software infrastructure, as we have done in previous years.

On March 13th and 14th, Jost Berthold visited the University of St Andrews, giving a seminar on Thursday (abstract below), and discussing topics related to parallel Haskell and high-performance symbolic computation with the groups of Kevin Hammond and Stephen Linton, based on earlier, joint research.

On March 20th, Jost Berthold visited the University of Glasgow, being hosted by Jeremy Singer, and the University of Strathclyde, giving an informal presentation of ongoing work, and discussing potential connections with the work on dependent types, performed in the group of Conor McBride.

On March 15th, Jost Berthold gave a guest lecture as part of the Heriot-Watt post-graduate course on "Distributed and Parallel Technologies" (abstract below), introducing the Eden extension to Haskell, and using the lab slot to help students in using the system.

On March 18th, Jost Berthold gave a seminar at Heriot-Watt University with the title "High Level Computing in Finance" (abstract below) to a wider audience, including colleagues from the Mathematics department, and from EPCC.

We spent March 19th on a HackDay, performing concrete implementation activities on a group of 10 researchers, involving HWU PhD students as well as external guests, such as a researcher working for Parallel Scientific, based in Dundee.

Overall, this visit was very productive, giving us an opportunity of joint research, and exchanging expertise on concrete implementation issues, as well as planning potential joint papers in the near future. For our PhD students it was a valuable experience of discussing their work with another world-leading expert in this domain.

Seminars given during the Visit:

Seminar: High Level Computing in Finance

Thursday 14th March at St Andrews - Time & location to be confirmed

Monday 18th March at Heriot-Watt, 13:15-14:15, G44 Earl Mountbatten Buildings

Abstract:

This talk will discuss parallelisation patterns and implementation variants for computations relevant to the financial industry. As part of the research centre HIPERFIT for Functional High-Performance Financial Information Technology, we are analysing and prototyping computation-intensive application kernels for pricing and financial modelling, to explore the design space for parallelisation and optimisation. Functional languages like Haskell with parallelism extensions provide a good abstraction level to reason about parallel programs without getting lost in implementation details.

We will give a brief introduction to parallel Haskell dialects to put the work into context, and then provide an overview of the research centre and its main directions. In the main part, we will discuss common parallelisation patterns found in financial application kernels, captured as "parallel skeletons" (library functions which describe algorithmic patterns in higher-order functions with a ready-made parallel implementation).

Multicore and GPGPUs receive increasing attention in a number of application areas with high computational demand, including the financial industry. However, identifying, allocating and controlling parallelism in massively parallel hardware is challenging, and programmers need to "think parallel" from the start in order to effectively exploit modern parallel computers. The functional paradigm enables to analyse and design applications for parallel computing from the start, and programming profits from a rich type system and libraries to express algorithms in a mathematical way.

Guest Lecture: Parallel Programming in Eden

Friday 15th March at Heriot-Watt, 14:15-15:00, G45 Earl Mountbatten

Buildings followed by a hands on lab session in EM 2.50

Abstract:

Eden is a parallel Haskell variant which extends Haskell with constructs for the definition and instantiation of parallel processes. Processes evaluate function applications remotely in parallel. In comparison to the GpH parallel Haskell variant, covered earlier in the course, the programmer has more detailed control over data distribution, communication topology, and evaluation site, without having to explicitly specify synchronisation or communication. This guest lecture will give an overview of Eden, discuss skeleton-based parallelism and its implementation in Eden, and will provide an hands-on opportunity to develop Eden code on the departmental Beowulf cluster.

HackDay: GpH/Eden Runtime-system Activities

Tuesday 19th March at Heriot Watt, 13:15 onwards, G45 Earl Mountbatten Buildings

The HackDay is a one day event, focussing on implementation issues around the GpH and Eden variants of parallel Haskell, and is intended for those with concrete expertise the parallel runtime system for Haskell. There is no fixed programme for the event, and the agenda will be developed on the day, depending on interest.