Isabelle Developers Workshop

Schedule

Thursday, 13th August

09:15 – 09:30 **Short Intro**

09:30 – 10:15 **Florian Haftman**
Isabelle/ML, Fundamental Isabelle Types, Antiquotations, Passing States, Accumulating Results, Name Space

Florian will give a quick overview over the fundamental datatypes of Isabelle, as well as various container, or context, types. He will also explain how logical entities can be referenced from the ML-level via antiquotations. Next he will describe the most important combinators of Isabelle and explain the most convenient calling conventions for combinators.

Coffee

10:30 – 11:15 **Makarius Wenzel**
Proof Methods

Proof methods are the most basic refinement mechanism in goal-directed reasoning. Makarius will explain how this sub-language of Isar fits into the larger picture of proof texts, both structured and unstructured ones. Users can either embed raw ML tactic expressions as methods in the text, or define their own methods with concrete syntax, and access the context and facts of a proof situation.

Coffee

11:45 – 12:30 **Christian Urban**
Tactics and Generic Proof Procedures

Christian will first explain the general ideas about Isabelle's goal state. He will also explain the most fundamental tactics and tactic combinators in Isabelle, as well as structuring techniques for generic proof procedures.

Lunch

14:30 – 15:15 **Sascha Böhme**
Parsing and New Commands

Sascha will give an overview of the ideas behind parsing and some of Isabelle's parsing combinators. He will also show how new commands can be introduced.

Free Time

Friday, 14th August

09:15 – 10:30 **Stefan Berghofer**
Simplifier, Simprocs, Conversions

Stefan will first talk about the interface of the simplifier (e.g. flags, modes). He will also explain simplification strategies, such as bottom-up and call by value, as well as optimisation of simplifying via skeletons. Another topic will be contextual rewriting, such as simplification with assumptions, mutual simplification of assumptions, and left-to-right simplification of assumptions. Simprocs will be described with the running example of proving

$$\{(x_1, \ldots, x_n).\ (x_1, \ldots, x_n) \in S\} \equiv S$$

for any n, as done in inductive_set.ML. Finally Stefan will describe conversions and how they can be used in tactical reasoning. He will explain the following implementation methods for how to indicate failure with conversions

- with option type,
- with exceptions, and
- with reflexivity.

An example for conversions will be the implementation of a simple simplifier.

Coffee

10:30 – 11:15 **Makarius Wenzel**
Proof Contexts

Proof contexts model a certain local situation in the middle of a proof document. This covers both logical aspects (parameters and assumptions) and arbitrary extra-logical data (specific to user tools). Makarius will describe some basic uses of this bread-and-butter concept of Isabelle, by relating Isar proof situations with their ML counterparts.

Coffee

11:45 – 12:30 **Makarius Wenzel**
Local Theories

Regular specifications in Isabelle are always relative to a certain local context that is provided by one of the major structuring mechanisms (e.g. locale, class, instantiation). From the perspective of the developer of a derived definitional package (e.g. inductive, primrec, function) this means to work in an abstract auxiliary context, which is called "local theory". Makarius will show how to make use of the (simple) definitional primitives offered by this important Isabelle infrastructure.

Lunch

14:30 – 15:15 **Stefan Berghofer**
How to Write a Definitional Package for Isabelle?

Stefan will first share his wealth of experience with writing packages in Isabelle and give some best practices of writing such packages (like first trying out the constructions on some examples, then figuring out a general construction principle). He will also explain how the interface of a package should be designed and how theorems can be stored.

Free Time

Saturday, 15th August

09:15 – 10:30 **Alexander Krauss**
Mercurial, day-to-day working with the repository and separate repositories

Coffee

10:30 – 11:15 **Fabian Immler**
Threads, External Processes, Sledgehammer

Fabian will explain how to work with threads in ML, i.e. generation, interruption and low-level synchronisation of threads. He will also describe locks and other methods for synchronisation, such as mailboxes and synchronised state variables. Dealing with interrupts will also be shown, as well as calling external processes. The running example will be the infrastructure for Sledgehammer.

Coffee

11:45 – 12:30 **Makarius Wenzel**
Isabelle/Scala System Programming

How can Isabelle/ML + Isar reach the outside world? Makarius will present a general architecture that has emerged from numerous discussions with people involved in prover interfaces over the past 3 years. The main idea is to provide a Scala/JVM view on Isabelle, that is meant to support robust GUIs, or client-server components, or more.

Technical note: Apart from the official Isabelle2009 version, Makarius ask to have installed on your laptop:

1. Java 1.6 runtime from `http://www.java.com` (for Linux) or the official version for Mac OS by Apple.

   Note that prepackaged JREs for Linuxes seldom work as advertised. Don't waste time on rpms or debs.

2. Scala 2.7.5 final from `http://www.scala-lang.org/downloads`

   Make sure that you can run "scala" at the terminal and get an interactive toplevel that is able to evaluate for example "1 + 2".

Lunch

14:30 – 15:15 **Christian Urban**
LaTeX-Hacking with Isabelle

Christian will give a rough overview about how LaTeX documents are generated in Isabelle. He will also show a number of tricks to modify the output that Isabelle generates. He will also explain how coloured slides can be produced with Isabelle and the Beamer package.

Free Time