Proof Reconstruction
Progress report

Diego Alejandro Montoya-Zapata
dmonto39@eafit.edu.co

Advisor - Andrés Sicard-Ramírez
asr@eafit.edu.co

EAFIT University

April 7, 2015

Work in progress...

Before starting with the reconstruction of the proofs, it is necessary to focus on the prerequisites:

- Haskell

Work in progress...

Before starting with the reconstruction of the proofs, it is necessary to focus on the prerequisites:

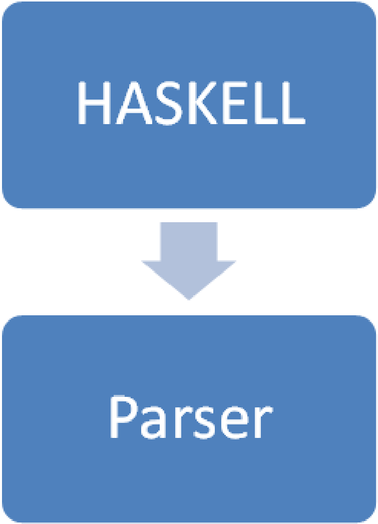
- Haskell
- Agda

Work in progress...

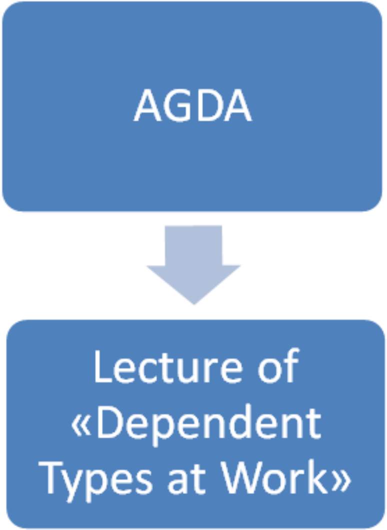
Before starting with the reconstruction of the proofs, it is necessary to focus on the prerequisites:

- Haskell
- Agda
- The ATP

Haskell



Agda[1]



[1] Bove and Dybjer (2009), "Dependent Types at Work".

Example[2]

The type of natural numbers in Agda is defined as the following data type:

Natural numbers in Agda

```
data Nat : Set where
  zero : Nat
  succ : Nat -> Nat
```

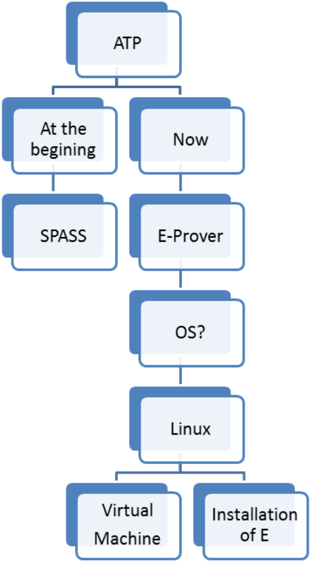
Now we can define the predecessor function:

Predecessor function in Agda

```
pred : Nat -> Nat
pred zero     = zero
pred (succ n) = n
```

[2] Bove and Dybjer (2009), "Dependent Types at Work".

ATP


ATP
At the begining
Now
SPASS
E-Prover
OS?
Linux
Virtual Machine
Installation of E

Example

Proof of the identity principle in E ($p \Rightarrow p$).

$p \Rightarrow p$

```
# Proof found!
# SZS status Theorem
# SZS output start CNFRefutation.
fof(c_0_0, conjecture, ((p=>p)), file('test.tptp', refl)).
fof(c_0_1, negated_conjecture, (~$true), inference(fof_simplification,[status(thm)],
   [inference(assume_negation,[status(cth)],[c_0_0])])).
fof(c_0_2, negated_conjecture, (~$true), c_0_1).
cnf(c_0_3,negated_conjecture,($false), inference(split_conjunct,[status(thm)],[c_0_2])).
cnf(c_0_4,negated_conjecture,($false), inference(cn,[status(thm)],
   [c_0_3, theory(equality,[symmetry])])).
cnf(c_0_5,negated_conjecture,($false), c_0_4, ['proof']).
# SZS output end CNFRefutation.
```