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Comparison of Two Theorem Provers: Isabelle & Coq

INTRODUCTION

Capture audience's attention:
Why is your topic relevant or important for the audience? What is the industry current situation? What problems have resulted from their current practices?

[Titul]
The last century was a crucial time not only in people's life, but also in science. In mathematics, it was the time of findings for a formal definition of the very basis, the time when the essence of mathematical reasoning was questioned. This has led to the impetuous development *(стремительное развитие)* of mathematical logics and computer science.

[Introduction-1]
On the slide you can see two fundamental works of this period, "The Principles of Mathematical Logic" by David Hilbert's and Wilhelm Ackermann, written in 1930th, the fundamental work in the area of formamlisation of logic in canonical way; and the work of Brouwer "On the significance of the principle of excluded middle in mathematics, especially in function theory", which subsequently has lead to development of *intuitionistic logic* as an alternative for classical logic.

Nowadays, as the scale and complexity of mathematics has has exploded, we need the automatic methods for verifying mathematical statements using logical reasoning. This is a field of the theory of automated theorem proving. However, it can be used to solve complex engineering problems as well, for instance, for proving the security properties of a software system or an algorithm.

[Introduction-2]
In this work we compare two widespread tools for automated theorem proving, Isabelle/HOL and Coq, with respect to the power of expressiveness and usability.

[Outline]
Firstly, we shall give some basic definitions of logical systems, and then we shall attempt to compare Isabelle and Coq and provide some proof examples in order to illustrate theis expressiveness and usability.

Establish credibility:
Who am I? Who is your tutor?
I am Artem, my tutor is Stavros :/
Purpose:
What _solution_ are you presenting that will help the science or industry to overcome/avoid their _problem_?
Problem: hard math theories, numerous of tools, very deep-level documentation => lack of information from usability point of view.
Solution: take two most widespread, compare them and describe feelings.
~~*Overview:*~~
~~*How have you divided up your talk? Briefly list your main topic areas: 1, 2, 3*~~

*(**Transition phrase**: previewing your first main point)*

In order to understand key differences btw considering proof assistants, we need to learn basics of underlying theories – they differences. First of all, what is the *formal system?*

BODY

1. **Foundation of formal approach**

   A. [Elements of a Formal System]
      - The formal system is a mathematical abstraction, that allow to derive set of *formulas* written in accordance with sytnax ...
      - In the figure you can see an example grammar of a formula ...

   B. [Definition of the Formal System]

- Thus, a *formal system* is simply a quadruple …
- The basic element of a formal system is the *proof* …

~~Curry-Howard correspondence, connection to proofs~~
C. [Classical Logic]
- Let's now take a look at the example of a Classical Logic …
D. [Intuitionistic Logic]
- Let's now consider an Intuitionistic Logic …

2. **Comparison itself**

A. bird-eye view
- Isabelle
- Coq
- Comparison
- illustrative …
- … examples

~~<nope, only two areas>~~

~~3. //**THIRD TOPIC AREA**~~

~~A. //Sub-topic one~~

~~B. //Sub-topic two~~

[Summary] To summarise results, …

CONCLUSION

Summarize the main points:
What has the audience learned today about each of your topic areas?
~~How hard the theorem proving is :/~~
Estimate feasibility:
Is the solution feasible in the near future?
~~Continue exploring :/~~
Return to the problem or need:
How will the listeners' world be changed by your innovation?
~~They would never ever work with thm provers :/~~
Encourage questions:
Show that you are interested in hearing your listeners' questions
~~If you are interested in this topic, please don't leave so soon :/~~