

Topics in Automated Deduction (CS 576)

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Isar

- Proof scripting language
- Machine readable
- Also human readable
- Supports structured proofs
- Designed to hide enough detail to increase ease of reuse

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Apply scripts

- Unreadable
 - Needs the to be interleaved with computer response
- Hard to maintain
 - Often contain very specific details that change when the theorem changes moderately
- Lacks structure
 - Can't tell where one subgoal ends and the next begins

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Apply versus Isar Scripts

Apply script = assembly language program
Isar proof = structures program with comments

Apply useful for proof exploration

Isar script useful for final proof documentation

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Typical Isar Proof

```
proof
  assume formula0
  have formula1 by simp
  :
  have formulan by blast
  show formulan+1 by ...
proves
qed
formula0 ⇒ formulan+1
```

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Isar Core Syntax

```
proof = proof (-|[method]) statement* qed
      | by method
method = (simp...) | (blast...) | (rule...) | ...
statement = fix variables (Λ)
           | assume props
           | [(from fact*)] (show|have) props proof
prop = [(label:)] string
fact = label
```

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