CS 3110

Logic in Coq

Prof. Clarkson
Fall 2018

Today's music: *Autologic* by Rage Against The Machine

Attendance question

Is every logical proposition either true or false?

A. Yes

B. No

C. Mu

Review

Previously in 3110:

- Functional programming in Coq

- Proofs about simple programs
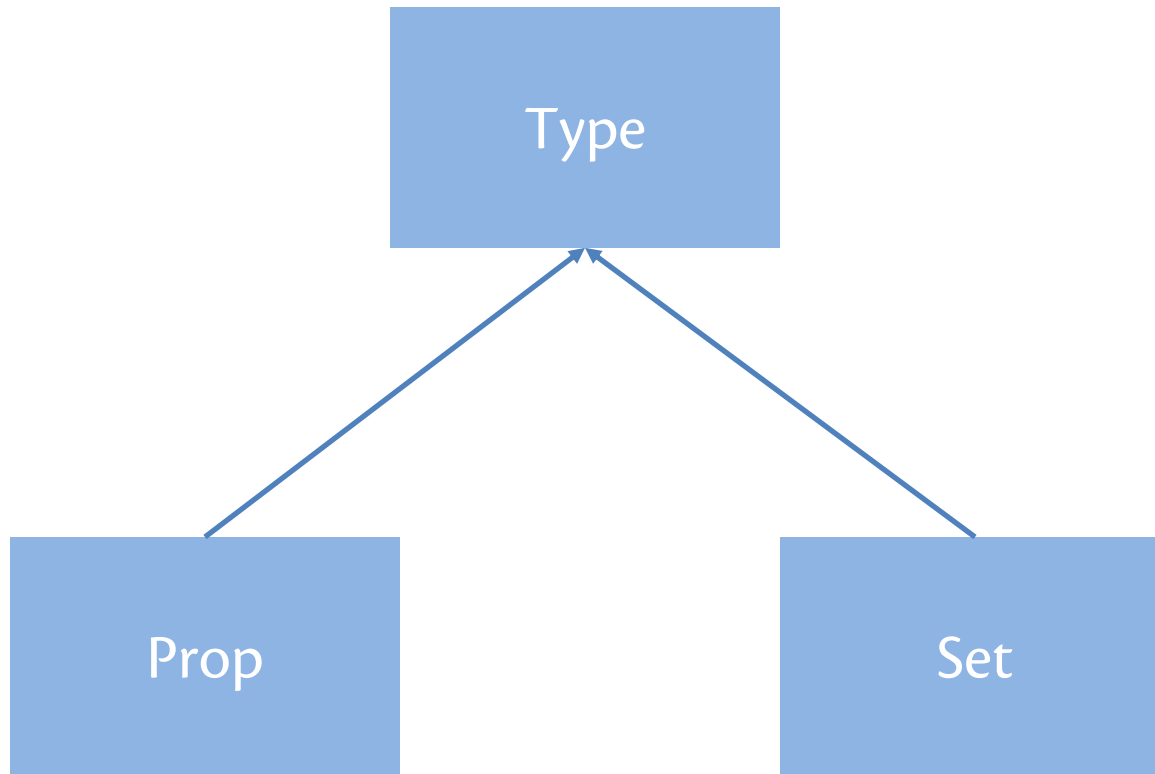
Today:

- Logic in Coq, at the CS 2800 level

TYPES

Type hierarchy

Propositions: specify assertions

Programs: specify computations

PROPOSITIONAL LOGIC

Logical connectives

- Implication: `p -> p`
- Conjunction: `p /\ p`
- Disjunction: `p \/ p`
- Negation: `~p`

Implication

```
Print p_implies_p.
p_implies_p =
fun (P : Prop) (P_assumed : P) => P_assumed
    : forall P : Prop, P -> P
```

output is that proof

p_implies_p
is a function

first input is a
proposition

second input is
proof of first input

Coq proofs
are
functional programs

Logical connectives

- Implication: `p -> p`

- Conjunction: `p /\ p`

- Disjunction: `p \/ p`

- Negation: `~p`

Upcoming events

- A9 GIST: today, 8pm, Gates 122

This is logical.

THIS IS 3110