



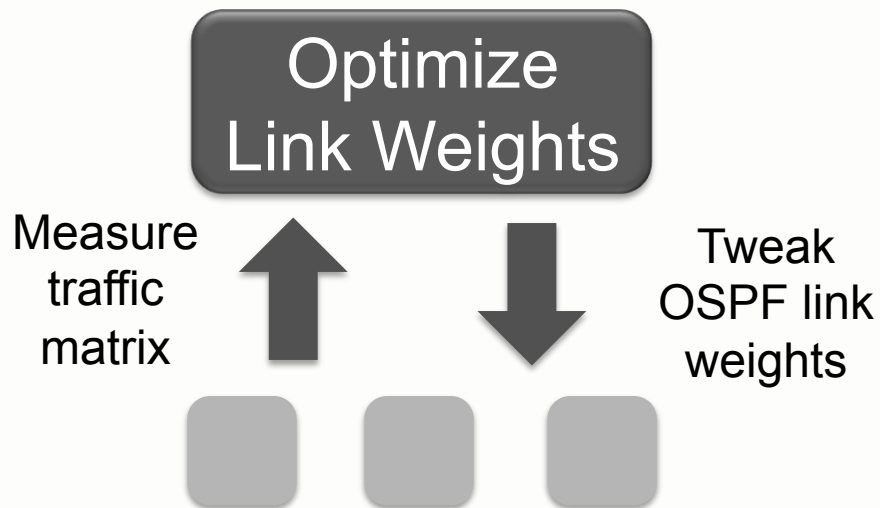
P4 Amore!

(Or, How I Learned to Stop Worrying and Love P4)

Jennifer Rexford
Princeton University

My Personal Path to P4

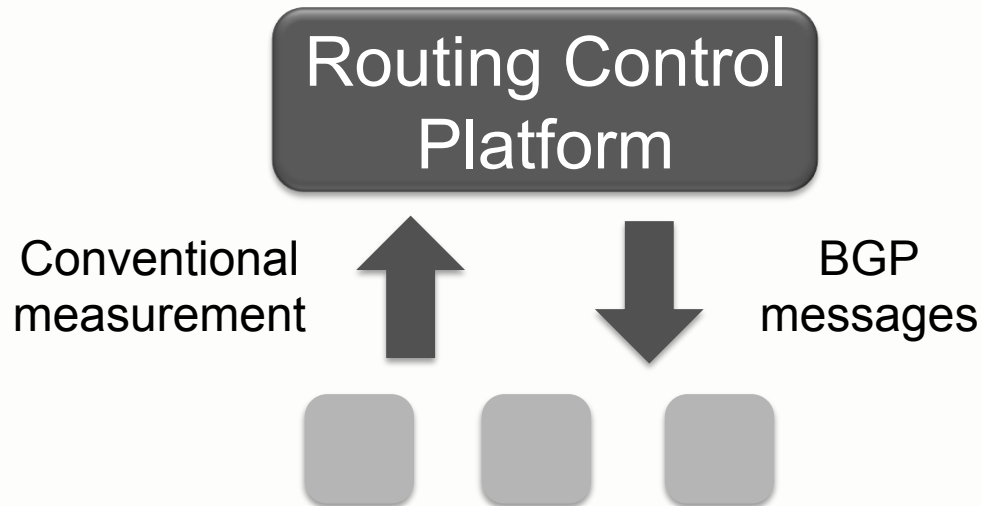
- *Centralized* network management ('97-'03)
 - Network-wide control, through unnatural acts
 - Indirect, by “inverting” the control plane
 - ... but, constrained by *command-line interfaces*



Collaboration with algorithms and optimization, and network operators!

My Personal Path to P4

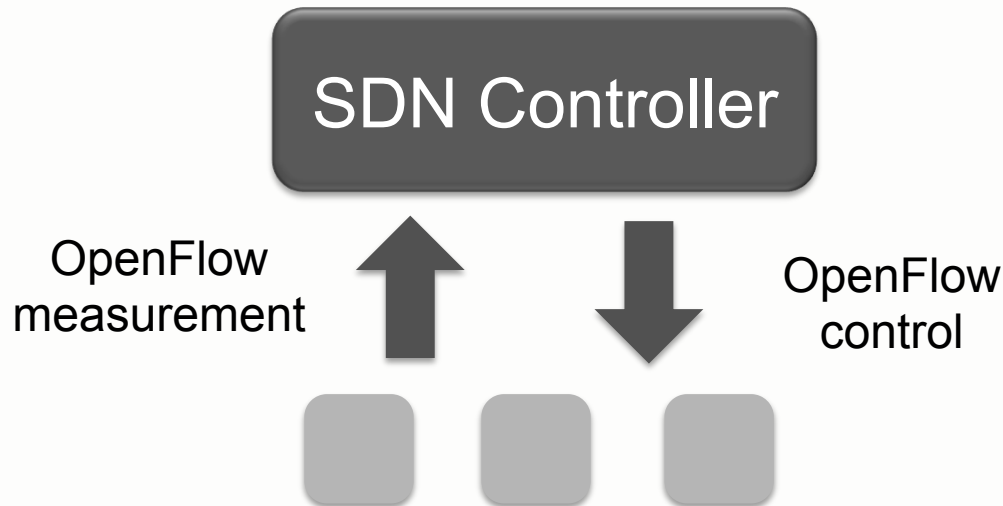
- *Direct* network control ('03-'07)
 - Direct, but only by abusing legacy protocols
 - Enabled innovation and real deployment!
 - ... but, constrained by *legacy control protocols*



Collaboration with
distributed systems,
and network operators!

My Personal Path to P4

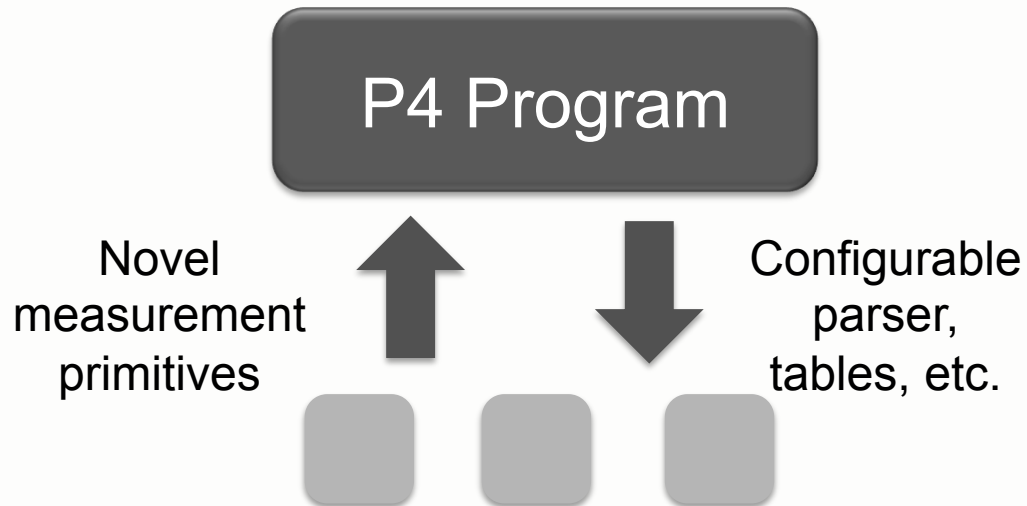
- *Open* network control ('07-)
 - Logically central control with open interfaces
 - Bigger scope for innovation and impact!
 - ... but, constrained by *legacy data planes*



Collaboration with programming languages to build control-loop abstractions on OpenFlow!

My Personal Path to P4

- *Protocol-independent* data planes ('13-)
 - Programs tell the switches how to behave
 - Header formats, parser, table graphs, actions
 - Finally, create the networks we want!



Collaboration with switch designers, programming languages, and more!

Excited About P4

- Get it right
 - Incorporating all the hard-won lessons
 - Programming abstractions driving the interface
- Leverage new technology
 - Reconfigurable ASICs, FPGAs/NPs, flexible NICs, software switches, ...
- Enable innovation
 - Traffic engineering solely in the data plane
 - Consensus protocol (Paxos) in the data plane
 - Detection and diagnosis of performance problems

P4 Language Consortium

- Build a community
 - A common language
 - Open-source software
 - Support for many target platforms
- Enable a wealth of innovation
 - Diverse “apps” (including proprietary ones!)
 - ... while leveraging commodity switches
- With a low barrier to entry
 - Free membership
 - Simple software licensing



Membership Growth

Operators



Systems



Targets



Academia



P4 Consortium Going Forward

- Adding board members
 - Currently, just Nick McKeown and me
 - Want to add at least one person, maybe three
 - (An odd number, more diversity, etc.)
- Building community
 - P4 tutorials (e.g., SIGCOMM'15)
 - P4 workshops (June'15, Nov'15, and beyond)
 - P4 boot-camp (later this week)
- Enabling bigger long-term impact
 - Become part of a larger open-source effort?
 - <Insert your ideas here!>

So, Welcome!

- A busy day
 - Talks, demos, discussions
- An opportunity to bridge divides
 - Diverse collection of attendees
 - Hardware and software, users and vendors, academics and industry, ...
- A chance to strategize
 - Creating a better P4 language
 - Planning for long-term impact

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