**Motivation**
- Debugging SDN applications is hard
- “Runs as designed” may be insufficient
- Deployment must cope with a wide range of operating conditions
- How can we answer the following question: Will my SDN app run as designed when deployed in a live setting?
  
  Our solution: OFf (built atop fs-sdn [1])

**Design Goals**
- A debugging and test environment for SDN developers
- Default debugging options (step, break, etc.)
- Comprehensive testing for SDN apps
- Tie unwanted network behavior to controller
- Simple, light-weight, no hardware support
- Facilitate transition to live environments

**OFF Commands**
- Longlist and shortlist source code
- Pretty print expressions
- Hide/unhide frames
- Interactive interpreter
- Track, watch, or unwatch variables
- Edit source files during debugging
- Enable or disable break points on the fly
- Sticky mode to visualize code

**OFF in Action**
- We demonstrate OFF in three scenarios:
  - Incorrect ordering of updates
  - Bad multi-app interaction
  - Unexpected rule expirations
- **Goal**: Identify logical bugs in the source code that lead to transient outages and losses

**Timeline**
- Future work: Multiple platform and controller support
- Source code available at: https://github.com/52-41-4d/fs-master

**References**