

Formal models of software-defined networks Feng, H.

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Propositions

pertaining to the thesis Formal models of Software-Defined Networks by Hui Feng

- 1. Incorporating formal models and languages into software-defined network development enhances overall system reliability by enabling thorough verification of network behavior and policies. [Chapter 1 & 2]
- 2. The coordination language Reo can be used to model software-defined networks, allowing for compositional and formal specification of network components and their interactions. [Chapter 3 & 4]
- 3. By translating Reo models into Promela code, developers can utilize the SPIN model checker to perform exhaustive verification of software-defined networks for correctness and reliability. [Chapter 5]
- 4. Constraint automata can be used to provide extended formal semantics for concurrent NetKAT programs, enabling modeling and analysis of SDN policies. [Chapter 6]
- 5. OpenFlow is a protocol for controlling network devices, but it is not synonymous with software-defined networking. The latter is a broader paradigm that encompasses various architectures and technologies beyond just protocol-level control.
- 6. Testing software-defined networks remains difficult due to their dynamic nature and the complex interactions between the control and data planes, which can obscure subtle errors.
- 7. One of the primary challenges in the formal verification of software-defined networks is ensuring scalability as network size and complexity increase, requiring advanced algorithms and heuristics to manage the computational load.
- 8. Temporal logic and other formal logic systems can be effectively utilized to specify and verify dynamic properties of software-defined networks, such as flow consistency and packet forwarding correctness.

- 9. The PhD process, with its intense focus on critical thinking and deep analysis, remains the gold standard for intellectual mastery and is increasingly critical in today's fast-paced, skills-based economy.
- 10. Engaging with new information has become a practical necessity, demanding constant adaptation to stay relevant. The true challenge lies in knowing what to prioritize and when to disengage.

Hui Feng Leiden December $3^{rd}, 2024$