Paper Evaluation, Onix: A Distributed Control Platform for Large-scale Production Networks

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1. Paper summary

The paper focuses on a SDN paradigm using the control platform in a distributed system due to the problem of lacking a network-wide management abstraction in traditional networks. The traditional networks are static networks, which means when it comes to a dynamic business that requires a timely adjustment of the network, it becomes very inefficient and even unenforceable. Therefore, the authors proposed Onix API for control implementation. The key idea is to use the Network Information Base (NIB) to store the graph of all network entities within a network topology and use control logic to to do read, alter and register operations. Since the NIB is the focal point of the system, the evaluation focus on the scalability of NIB and the reliability in the face of failures.

2. Top 3 contributions

1. The first contribution of Onix is that it exposes a far more general API than previous systems.

2. Also, it provides flexible distribution primitives (such as DHT storage and group membership) allowing application designers to implement control applications without re-inventing distribution mechanisms, and while retaining the flexibility to make performance and scalability trade-offs as dictated by the application requirements.

3. Additionally, the Onix makes it possible for the control platform to handle the lower-level issues while allow developers to program their control logic on a high-level API.

3. Problems

1. As described in the paper, the API is data-centric and needs to provide a synchronization primitive, which may cause ordering and long latency problems.

2. It must use a mechanism like a replicated database or a one-hop, memory-only DHT to keep state consistent. But the two mechanisms both have different limitations. Like DHT, state inconsistencies may happen due to multiple writers and callback delays.

3. Onix uses partition and aggregation method to improve scaling. But at some points, the number of elements within a control domain may overwhelm the capacity of a single Onix instance. Dealing with the inter-domain aggregation is also a problem.