ĐẠI HỌC
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Applications to Traditional Networks

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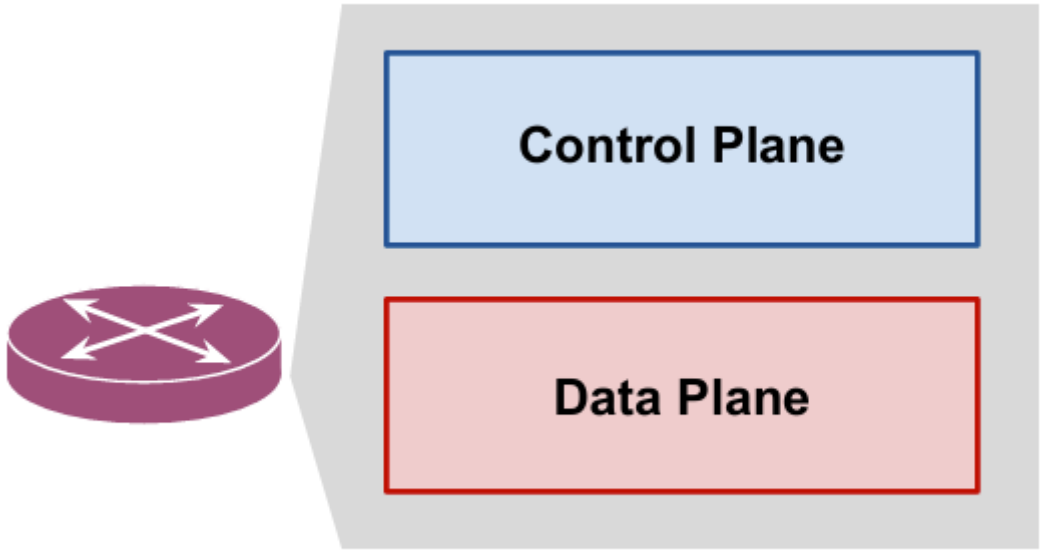
ONE LOVE. ONE FUTURE.

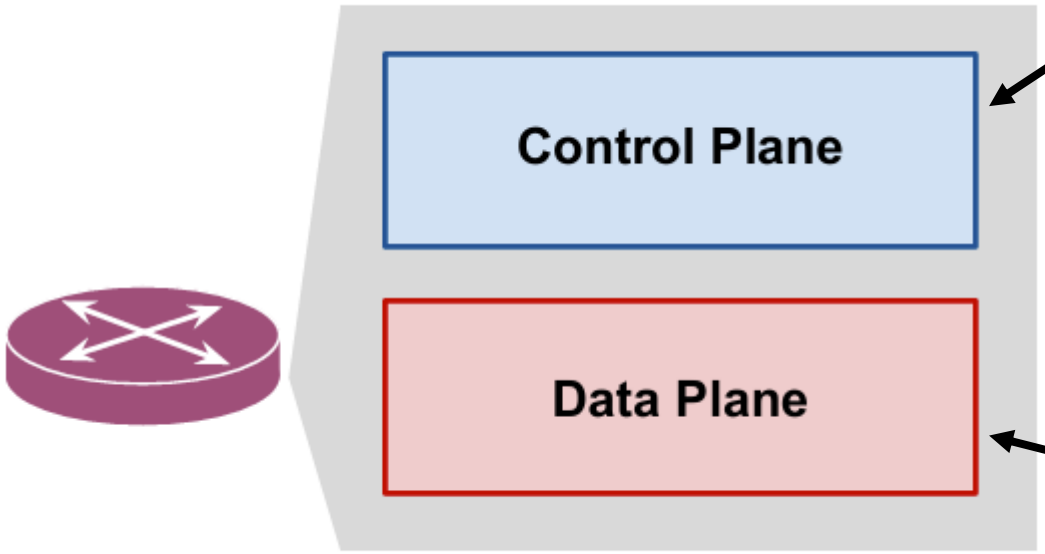
Contents

1. Programming Traditional Networks

Problem with Traditional Networks: No direct programmatic control over devices, just configuration interfaces, just for a handful of protocols.



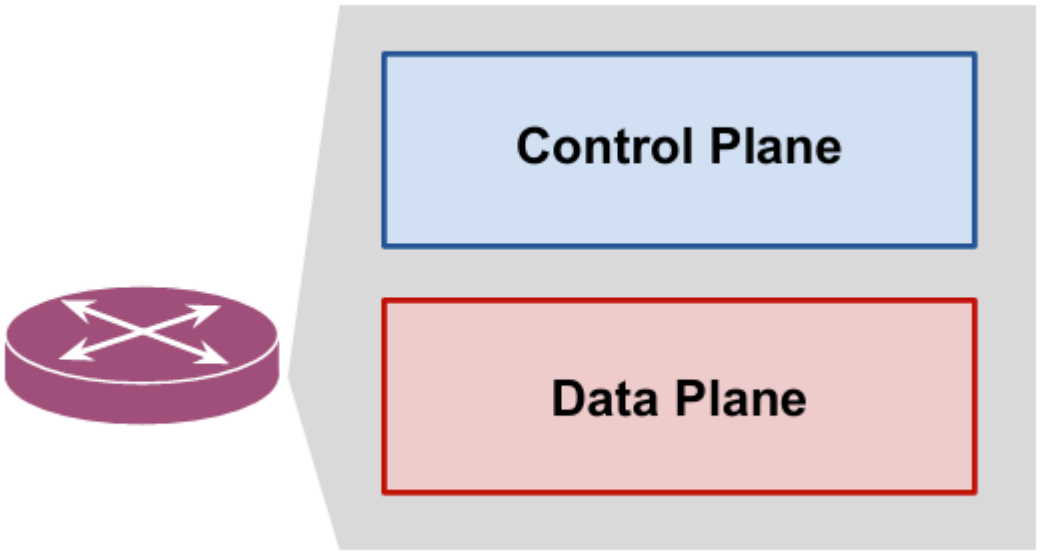
1. Programming Traditional Networks



- A (closed-source) OS and a set of apps that comes with the devices.
- Can only configure the already-implemented protocols through a limited and not-so-easy-to-use interface.

- Exposes a fixed-function pipeline.
- Unless you were who built the chip, you couldn't change which headers are parsed, which tables match on which fields, and in what order they are executed.

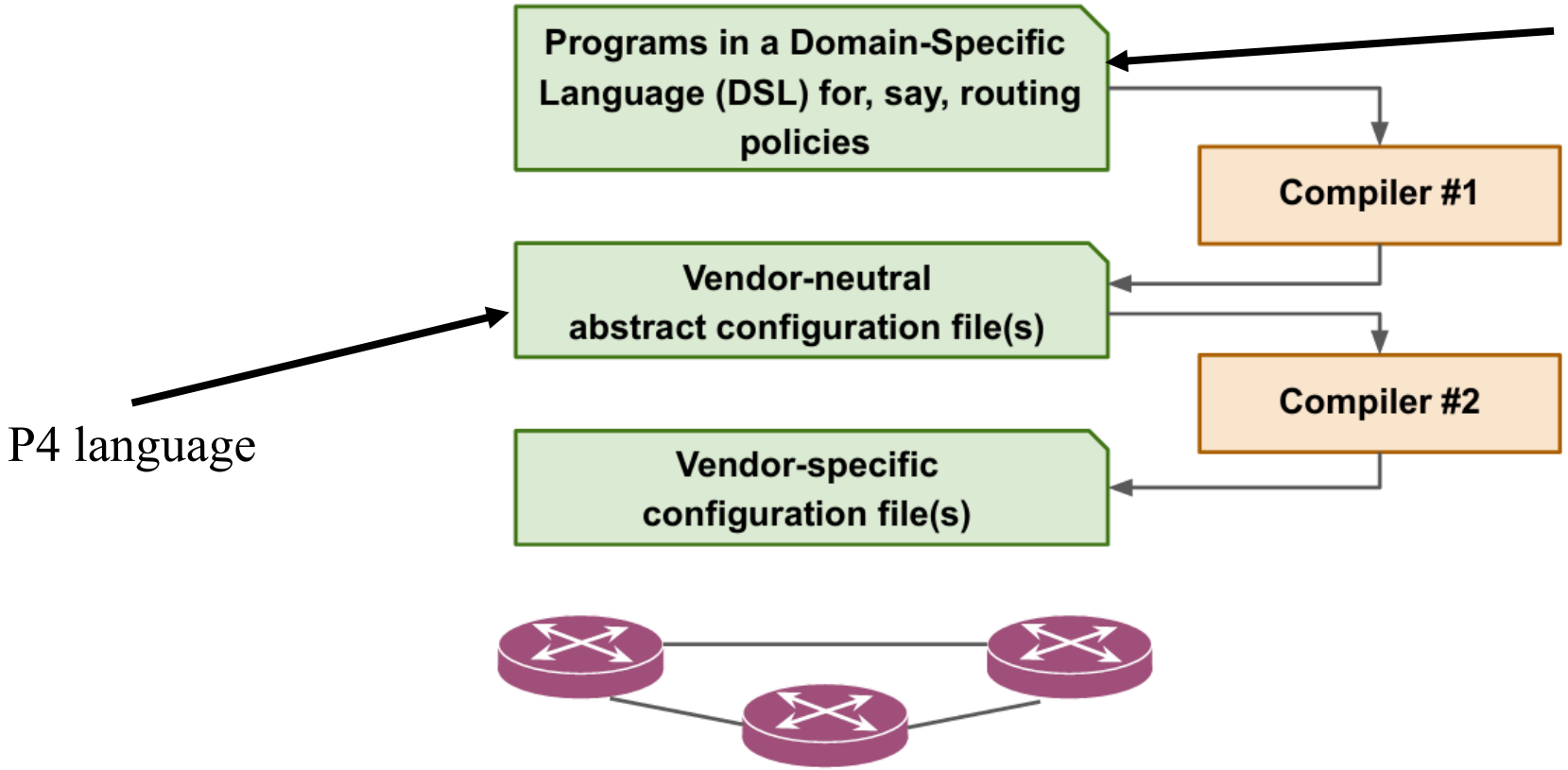
1. Programming Traditional Networks



→ Need abstraction and automation in traditional networks.
→ Work on automated management tools predates SDN.

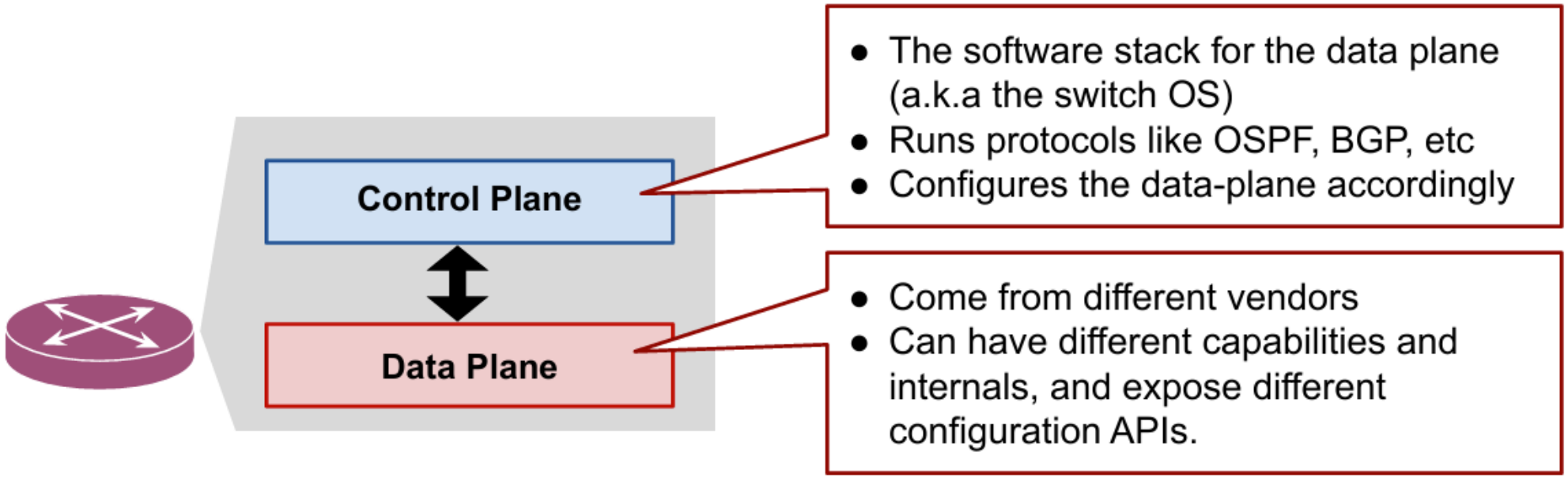
2. Automated Configuration Generation

e.g., traffic from A to B should always take the shortest path, or link L1 should only be used as back-up if the primary paths fail.



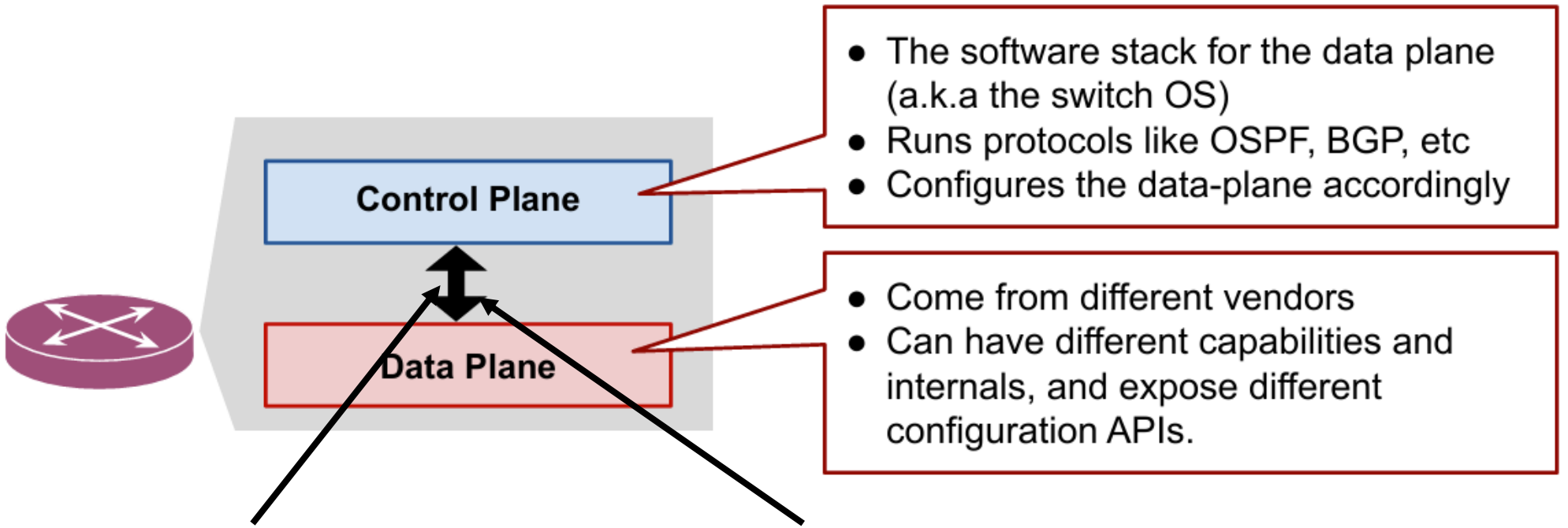
3. Well-defined specifications

Traditional Networks: not-well-defined specifications



3. Well-defined specifications

Traditional Networks: not-well-defined specifications

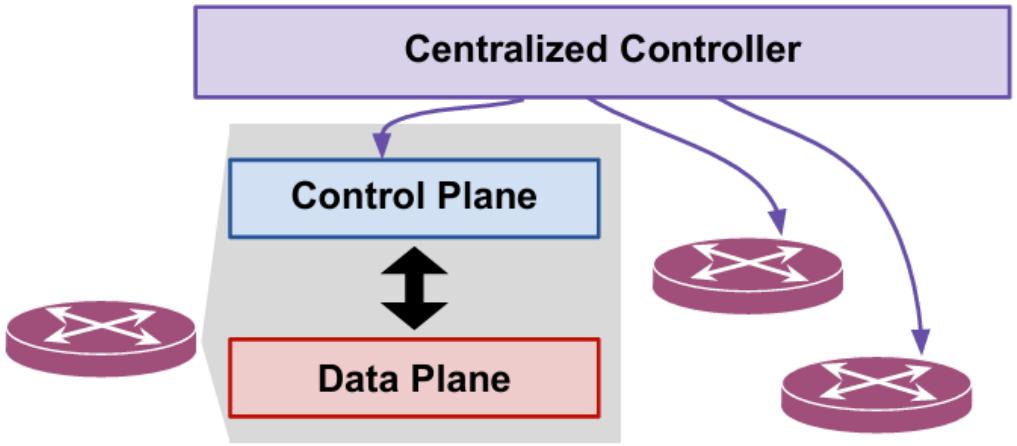


Informal specifications in English
- Ambiguous Control Plane
- Difficult to maintain a complete updated version

Without proper abstractions, you may not be able to reuse much of the switch software stack across different data planes

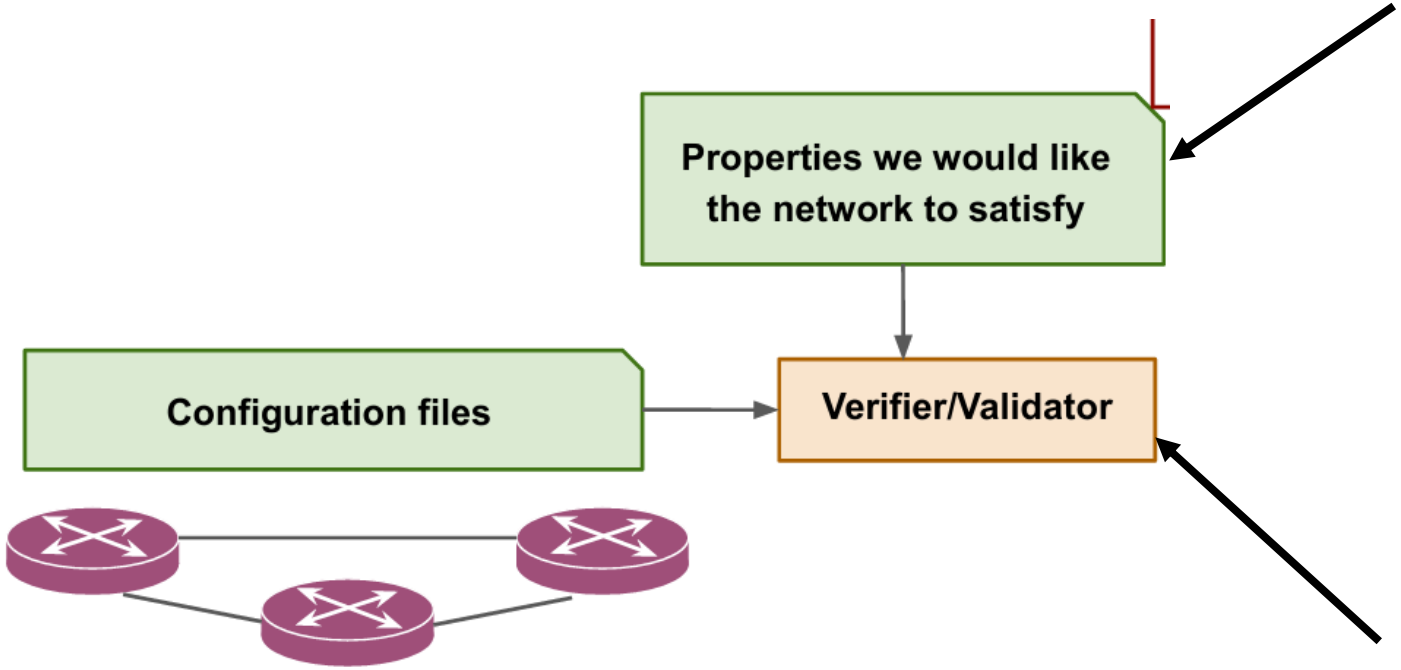
3. Well-defined specifications

Traditional Networks: towards well-defined/formal specifications



- Switch Abstraction Interface (SAI).
- Software for Open Networking in the Cloud (SONiC).
- Use P4 to specify (as opposed to program) the data-plane functionality.
- Using unified abstractions in individual devices makes that a lot easier.

4. Automated Validation



e.g., traffic from A to B should always take the shortest path, or link L1 should only be used as back-up if the primary paths fail.

- The property holds under all inputs to the network.
- Test cases (e.g., packet traces) to exercise individual switches or end-to-end network paths for desired properties.

HUST

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THANK YOU !