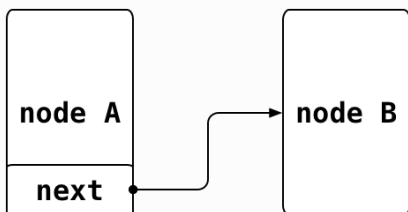
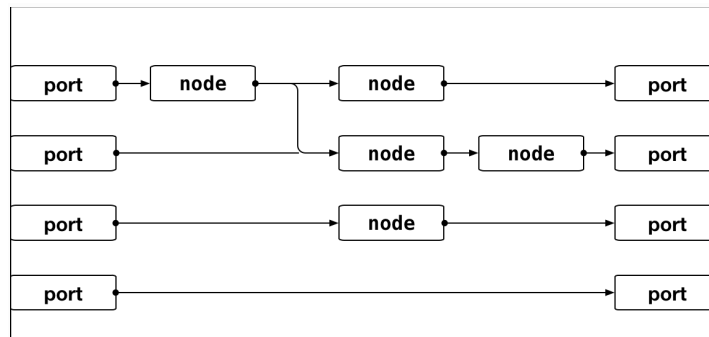


'Advanced Forwarding Interface' Data Model for Data Plane Programmability

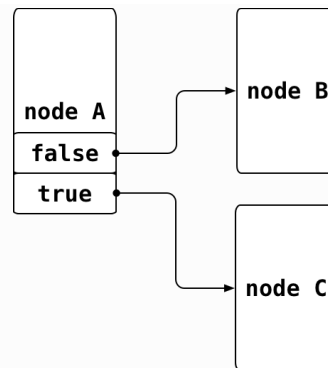
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Software Defined Networks (SDN) allows control plane of networking devices to be shifted out of the networking devices. Standardizing the interface through which control plane can program the data plane residing in the networking devices, is one of the main problem, yet to be fully solved, of SDN. Industry is currently trying to define and adopt the right technology to be used for data plane programmability. Two technologies which industry is trying to standardize and adopt are SAI and P4 (OpenFlow is the pre-runner to P4). For a technology to be successful for data plane programmability, the right level abstraction for forwarding plane using a data model is the key. If the data model is defined at very low level then the complexity is shifted to application programmers which may render it a non-starter. And if define data model is defined at high level then it may not be able to support the real computer network use cases. The data model should also be easily realizable on major commercially successful forwarding plane solutions (ASICs, NPU's FPGAs etc).

AFI (Advanced Forwarding Interface) is Juniper's approach for defining data model for forwarding plane of networking devices. AFI data model defines data plane as forwarding topology graph of potential operations (nodes) to be performed by packet forwarding engine (PFE) on packet.



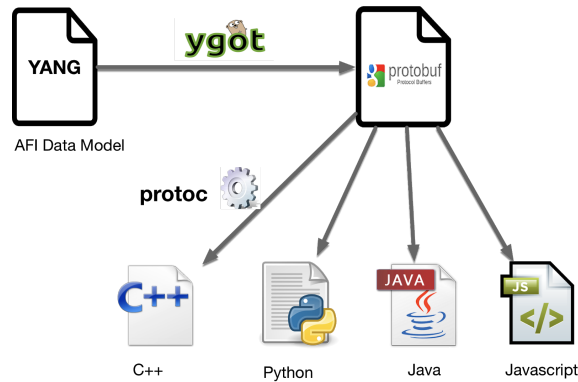
A Node can have reference to other nodes



A simple conditional if-else node

AFI data model can be used by any vendor to model and program the data plane using its forwarding ASICs. In case of Juniper, using AFI data model third party developers will be able write applications to control and manage forwarding path in the data planes of Juniper's platforms. Please note that JUNOS

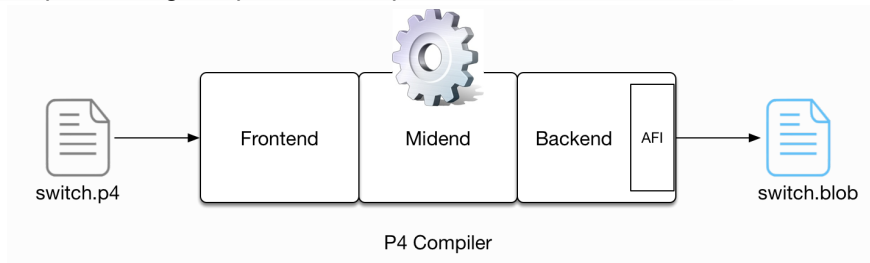
also will use AFI Data Model internally to implement the features/use-cases which Juniper's platforms support. The AFI data model is defined in YANG data modeling language. Language bindings for all popular languages can be generated from this YANG model. It allows controller/application to be written any language of choice.



P4 is programming language to define the behavior of the data plane of networking devices. Juniper will showcase the flexibility and usability of AFI yang model by demo'ing the support of P4 using AFI Data Model on

- ❑ **VMX**: Juniper virtual router based on Juniper's fully programmable TRIO asic. TRIO is Juniper's microcode programmable ASIC. It powers Junipers MX Series 3D universal edge routers.
- ❑ **QFX5200**: Juniper's switch built using a Broadcom's Tomahawk ASIC.

P4 program is compiled, using Juniper's P4 compiler, into an AFI data model.



This AFI data model representation is pushed to ASIC by JP4Agent (P4 Runtime server implementation for Juniper's platforms).

