

Barista: A Highly Composable NOS Brewing Framework for Software-Defined Networks

Jaehyun Nam*, Hyeonseong Jo*, Yeonkeun Kim*, Seungwon Shin*, Pillip Porras# and Vinod Yegneswaran#

*KAIST, Daejeon, Korea

#SRI International, CA, USA

Motivation

► Popularity of Software-Defined Networks

» Deployment of SDN in diverse network environments (e.g., enterprise, data center and cloud networks)

► Specialized NOSs in different dimensions

» ONOS and OpenDaylight for distributed scalability
» Rosemary and SE-Floodlight for enhanced security

► Appearance of customized NOSs based on existing NOSs

» 15 of 22 companies releasing their products based on OpenDaylight (SDx Central Market Report in 2015)

► Difficulty to choose NOSs fit into the purpose of customers

» NOS for high performance and high availability?
» NOS for high confidentiality and high integrity?

Five Dimensions of today's NOSs (SP-CIA)

► Scalability

► Performance

► Confidentiality

► Integrity

► Availability

Contributions

► Analysis of existing NOSs and their constituent elements (components)

► NOS building framework with common and specialized components

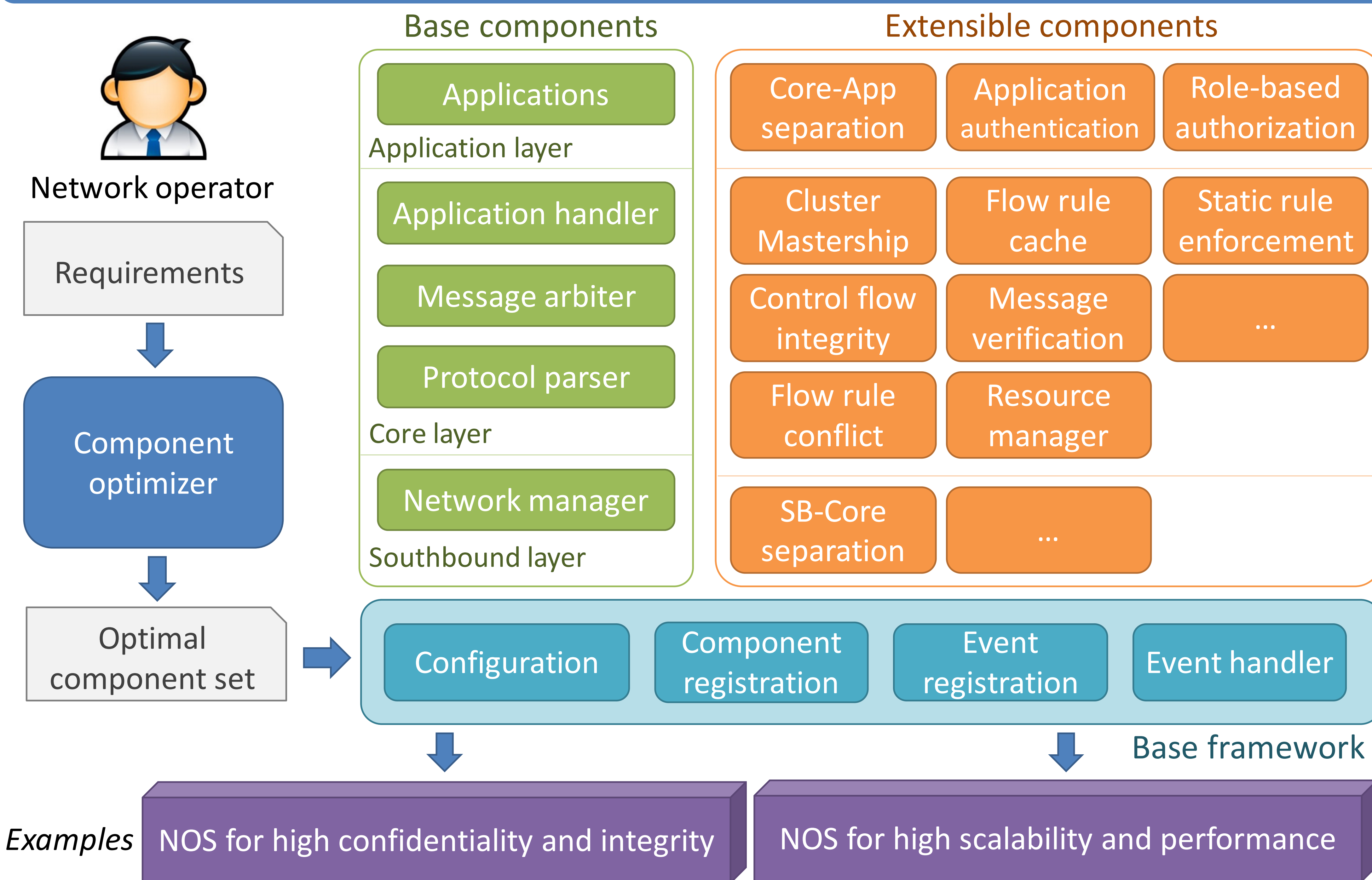
► Automated algorithm for optimally assembling NOS components

Key Insight

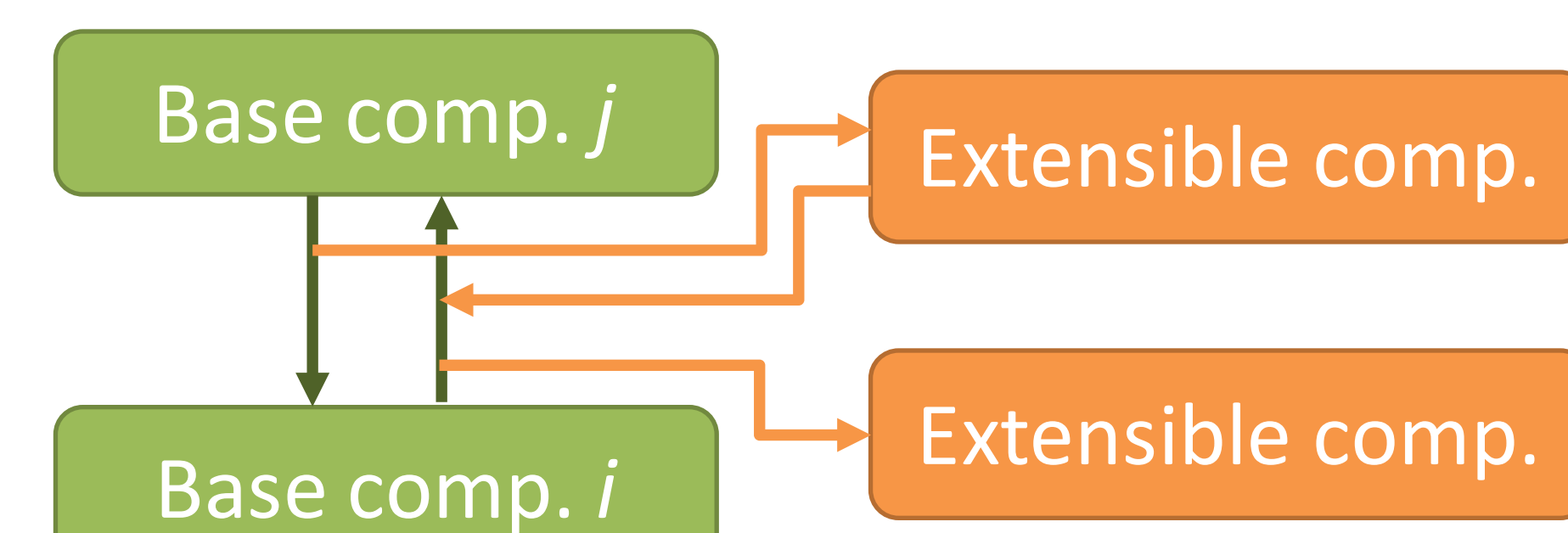
"Let me know what you want. I will make a new customized NOS for you."

Design

Barista architecture



Integration of extensible components



► Event-based communication

» Full isolation of each component
» No direct communication b/w comp.

Component optimizer

► Prerequisite for optimization

» High-level priorities for SP-CIA
» Importance metrics for each comp.
» Restrictions of CPU and memory

► Optimization process (based on LP)

» Discovering components fit into specific needs while maximizing resource utilization

Evaluation

► Test environment

