



Crossbow for Developers

Jayakara Kini
Sun Microsystems

Agenda

- What is Crossbow?
- Crossbow Features
- Crossbow Kernel Implementation
- Benefits of Crossbow
 - For production systems
 - For developers
 - For testing and sustaining
- What next?

What is Crossbow

Virtualization of network around any service, protocol or virtual machine.

Crossbow Features

- Performance Improvement
 - Hardware Classification
 - Switching between polling and interrupt
 - NUMA aware
 - Faster forwarding paths
- NIC Virtualization
 - Takes advantage of h/w rings
 - If h/w rings not present, emulates them in s/w
 - h/w based switching

Crossbow Features

- Virtual Switches (etherstub)
 - Standalone switches or linked to physical switch
 - Used for network-in-a-box
- Service Virtualization (flows)
 - Based on IP Address, subnet, transport, port, DSCP tags
- Resource control (cpu, bandwidth, priority)

Crossbow Features

○ IP Instances

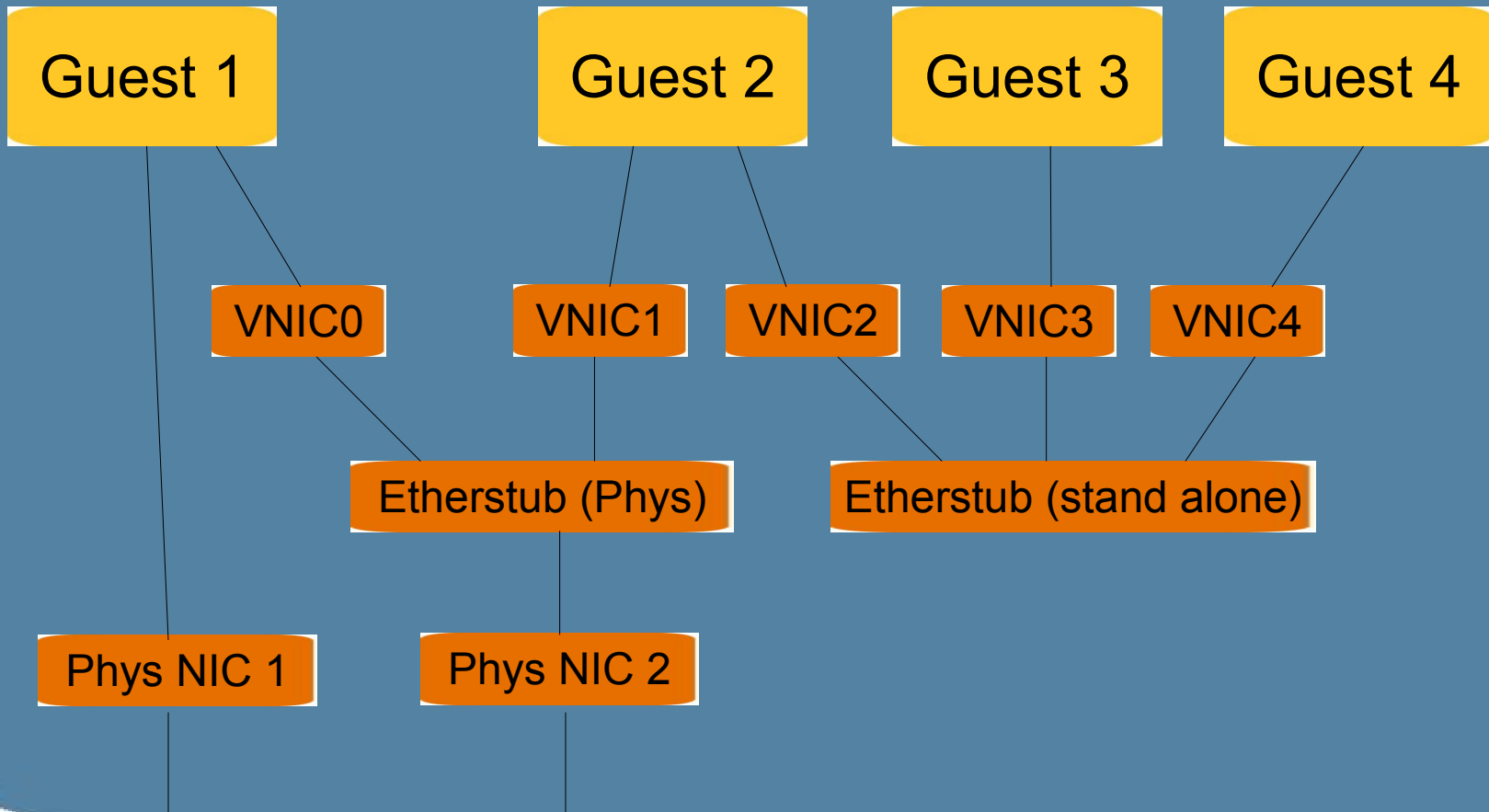
- Isolates the network between each instance
- Resource management and accounting
- 'Exclusive IP' property for zones only
 - same feature used for VNICs too

○ Accounting

- Per VNIC and per Flow

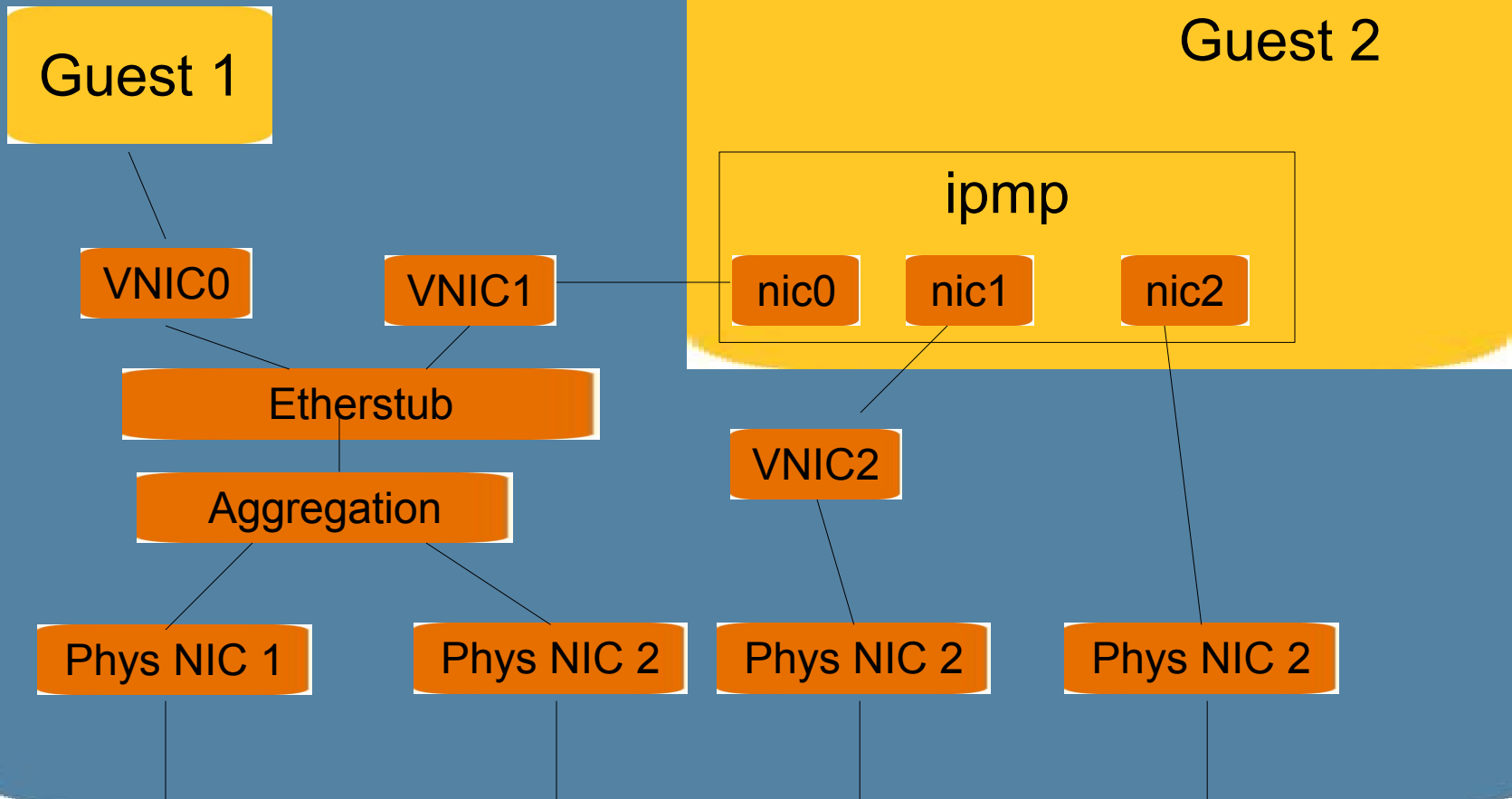
Crossbow Diagram

Solaris Host with Crossbow

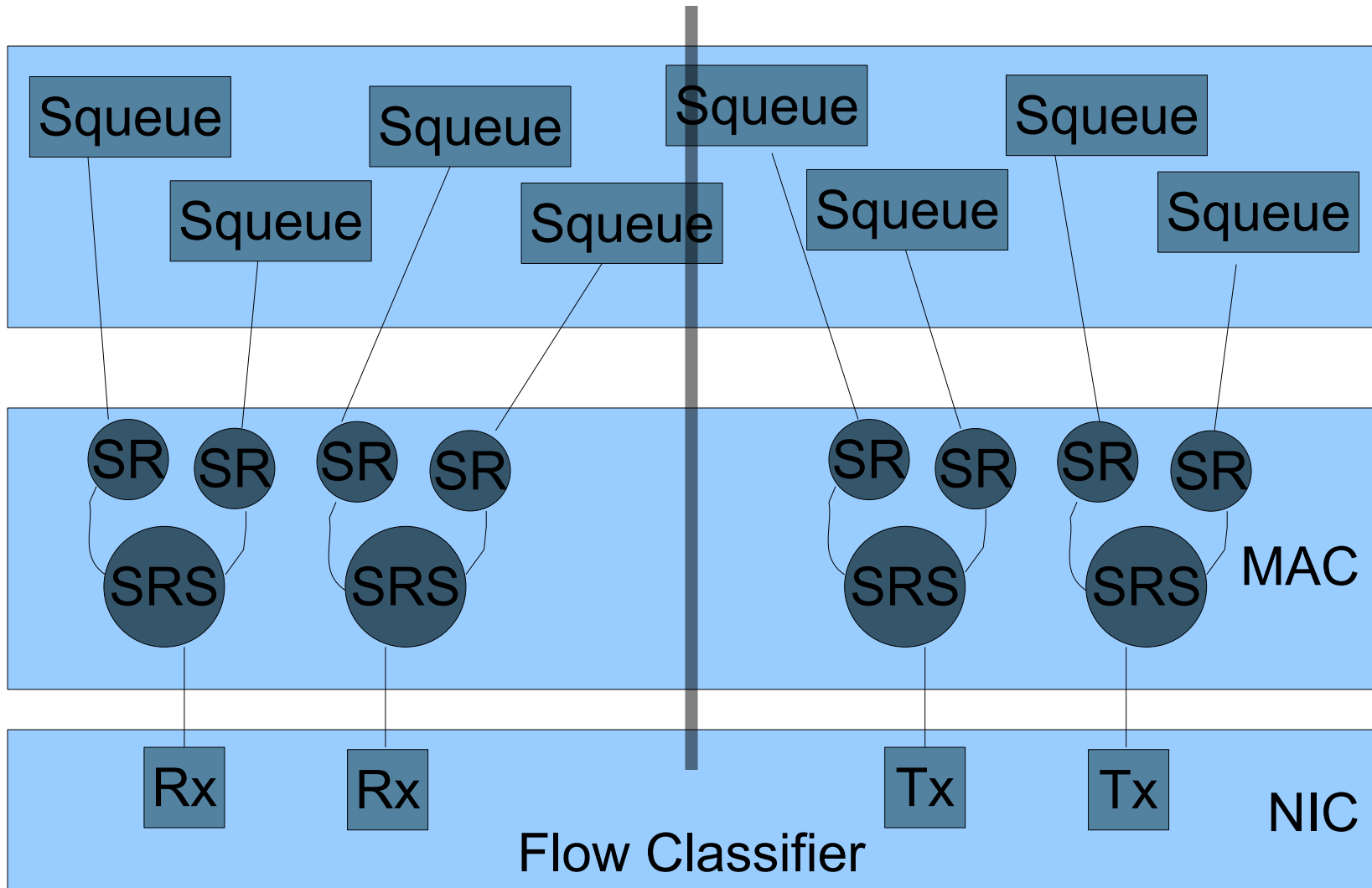


Crossbow Diagram

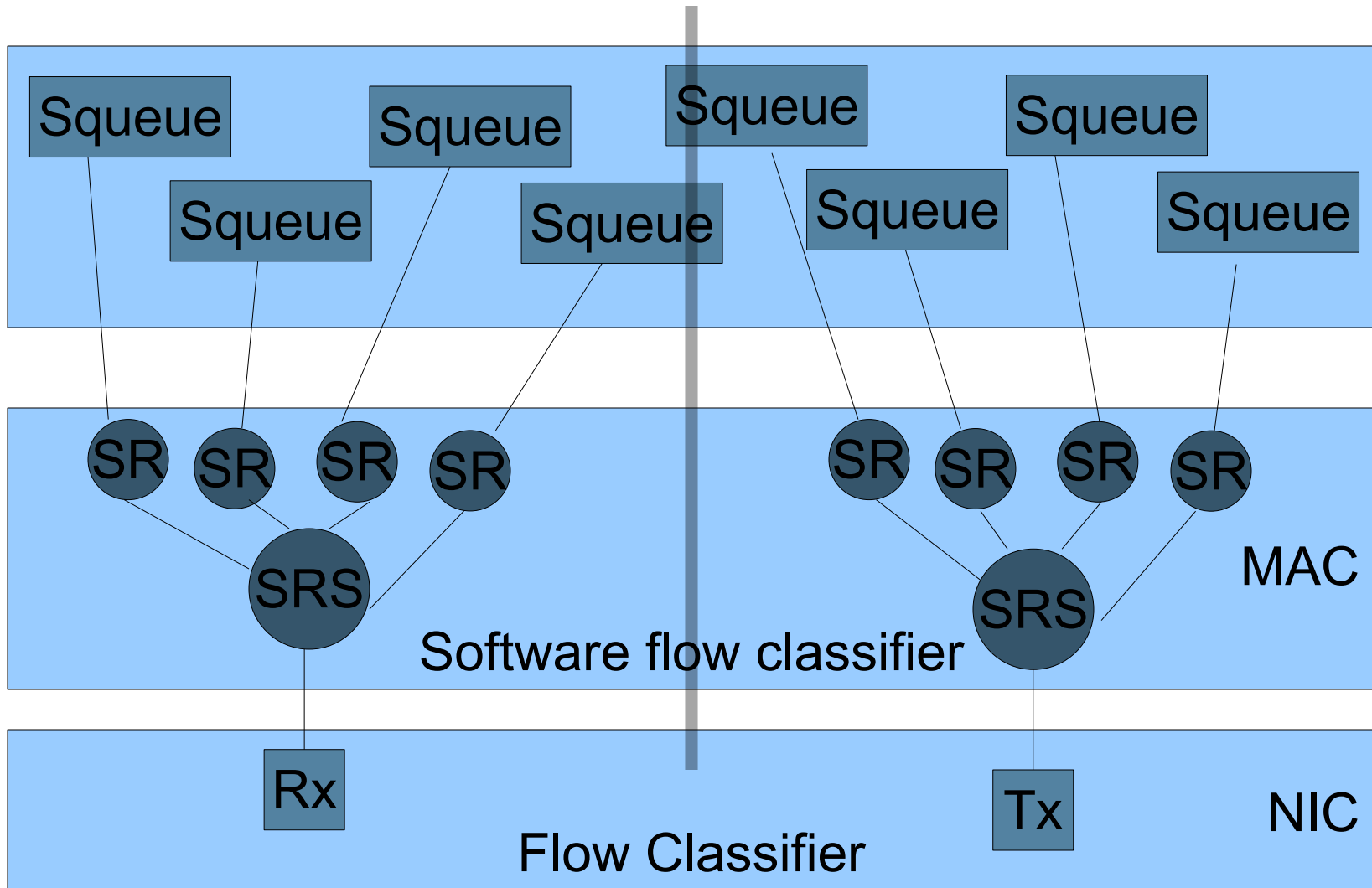
Solaris Host with Crossbow



Crossbow Kernel Implementation



Crossbow Kernel Implementation



Benefits of Crossbow

- Consolidation
 - Helps in server consolidation
- IP Instances
 - Isolation of networks
- Network-in-a-box
 - Setup multiple subnets in one box
- Router
 - Forwarding path performance improvements

Advantages and Disadvantages

- Advantages for development
 - Simulating production setup
 - Testing and recreating issues
- Limitations of different setup
 - Resource (memory, disk, cpu)
 - OS type

Examples

- Add commands to show different setups

Future

- APIs at all levels in the kernel
- Improved statistics and accounting
- Bandwidth guarantee
- Inter VNIC fastpath
- Improve flow performance for dumb NICs
- Dynamic resource assignment



Thank You

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