Jobber
Automating Inter-Tenant Trust in The Cloud

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How can we make the Data Center...

more efficient?
more secure?
more manageable?
Over 50% Enterprise Companies Use Cloud Infrastructure*

10% to 40% of all Data Center Traffic is Inter-Tenant Traffic*

emphasis is on isolation
hindering inter-tenant traffic
all traffic is untrusted
manual static configuration
misconfiguration is a major security problem
extra overhead

prone to error

untapped potential
optimize trusted traffic
optimize trusted traffic while filtering untrusted traffic
automatically
Jobber

a dynamic network security architecture
designed to handle the
volatile nature of the cloud
and the desire for
optimized inter-tenant communication
Jobber Components
How can we securely designate trusted and untrusted traffic?
trust networks
Introduction Based Routing

Social Relationships

Behavioral Reputation

Introduction Based Routing

Host M

Host Q

Host G
Introduction Based Routing

Host Q

Host M

Host G
Introduction Based Routing
Introduction Based Routing
How can we automatically ascertain and track reputation?
sensor frameworks
Open Source Frameworks
(nagios, ...)

Platform-Specific Frameworks
(Amazon CloudWatch, ...)

Custom Solutions
(Big Data analytic tools, ..)
Jobber Sensor Framework

- Tenant Reputation Database
- Tenant Aggregation Layer
- Behavior Classification Layer
- Sampling and Throttling Layer
- Data Collection Interface

- Intrusion Detection System
- Host System Logs
- Firewall Alerts
- Router Status

Etc...
Jobber Sensor Framework

Data Collection Interface

Tenant Aggregation Layer

Behavior Classification Layer

Sampling and Throttling Layer

Tenant Reputation Database

Tenant Reputation Query Interface

Jobber Server

Intrusion Detection System

Host System Logs

Firewall Alerts

Router Status

Etc
How can we control network and resource access?
programmable routing
Standardized Interfaces
(OpenFlow, MPLS, GRE, ...)

Cloud Platforms
(EC2, OpenStack, ...)

Vendor Systems
(Cisco, HP, ...)
Jobber Architectures
Data Center
Legacy vs Future

Host
Modified vs Unmodified

Jobber Routing
Active vs Passive

IBR
Distributed vs Centralized
Legacy Data Center

Host Aware
Tenant A

- Jobber Client
- Local Apps
- Local Firewall
- Virtual Machine

Tenant B

- Security Middlebox
- Jobber Client
- Local Apps
- Local Firewall
- Virtual Machine
<table>
<thead>
<tr>
<th></th>
<th>Legacy Aware</th>
<th>Legacy Agnostic</th>
<th>SDN Agnostic</th>
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<tbody>
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<td></td>
<td></td>
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<tr>
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Legacy Data Center

Host Unaware
Tenant A

- Local Apps
- Local Firewall
- Virtual Machine

Tenant B

- Local Apps
- Local Firewall
- Virtual Machine

VPC Router

Sensor Framework

Security Middlebox

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Jobber Server

Local Firewall

Local Apps

Virtual Machine
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SDN Data Center

Host Unaware
Data Center Network

Provider SDN Controller

Provider Jobber Client

Provider SDN Switch

Jobber Server

Sensor Framework

Security Middlebox

Tenant A

Virtual Machine

Local Apps

Local Firewall

Tenant B

Virtual Machine

Local Apps

Local Firewall
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Current Status
Complete
Multi-Architecture Design
Proof-of-concept Prototype

In Progress
Full-system Prototype for SDN Arch.
Partial Prototypes for Legacy Archs.

To Do
Performance Analysis & Evaluation
Usability Analysis & Evaluation
How can we make the datacenter...

more efficient?
more secure?
more manageable?
Jobber Provides...

efficiency
via direct inter-tenant communication

security
via introduction-based-routing

manageability
via automatic network control
Questions
Graduated or Binary Trust Designations?

Acceptable Overhead?
Performance Requirements?

Best Architecture?

Jobber as a Service?

Economics of IBR?