Technology Transitions & Our Evolution

Movement Hybrid Engineer

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Former Distinguished Engineer, Cisco

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Introducing NetNuvem!

- Founded in 2014, as a Systems & Software Integrator (SSI), we are a preferred Cisco Integrator Partner for delivering secured Enterprise and DC technologies and architectures, including SDN, NFV, software development and automation and orchestration.

- SSI closely aligned for delivery Cisco Professional Services, Automation and Training Content Development and Delivery.

- Our team includes some of the industry’s most highly experienced Architects, Engineers, Developers and Program Managers holding Advanced IT (Cisco CCIE, Redhat, VMware, etc.), PMI Advance Program Management, Security Risk Assessor and Agile Scrumaster credentials.

- Rapidly expanding Customer Base: Including key Fortune 500, Enterprise and SP accounts.

- Corporate Headquarter in Santa Clara, CA. with local & regional presence.
Pace of Change is Accelerating

- 50B Connected Devices by 2020
- 80% of enterprise apps were deployed in the Cloud in 2014–16
- 300K apps available in 2010→2M+ in 2014–16
- More data created in 2012 than the past 5000 years
- Connected devices outnumbered people in 2014–16

- Mobility, Identity, Security
- NGDC, Cloud, SDx, NFV
- DevOps, Apps, Containers
- Big Data, Analytics
- IoT, IoE, Fog
- Open Source

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The Only Constant is Change

Secure Users and Applications

Better Application Experience

Open Standards and 3rd Party Integration

Lower Bandwidth Costs

Faster Network Changes Through Automation

Increase Bandwidth Optimization

Deploy Cloud Based Applications

IT is Expected to Achieve All the Above and a Lot More… Across the Enterprise
A Fundamental Shift in Networking is Needed

Policy-Driven

Automated

Agile

What if you could...

- Enable sophisticated network capabilities with simplicity
- Easily enforce policies across wired, wireless, and WAN
- Treat the network as a single sophisticated system
- Get instant view of issue location to speed remediation
- Deliver service innovation more quickly
- Predictably administer changes and add capabilities

Traditional Networking CANNOT Keep Pace with the Demands of Digital Business
Digital Business Demands OP Efficiency & Agility

“...While other components of the IT infrastructure have become more programmable and allow for faster, automated provisioning, installing network circuits is still a painstakingly manual process...”
—TechTarget/Network Evolution, April 2015

Network Expenses

<table>
<thead>
<tr>
<th></th>
<th>CAPEX</th>
<th>OPEX</th>
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<tbody>
<tr>
<td>33%</td>
<td>67%</td>
<td></td>
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Deployment Speed

<table>
<thead>
<tr>
<th></th>
<th>Computing</th>
<th>Networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>0</td>
<td>10</td>
</tr>
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Source: Forrester

80% Time IT spends on operations

57% CEOs are worried about IT strategy not supporting business growth

Source: Open Compute Project
Applying IT Automation Tools to Networks

Device to Admin Ratio

“I can spin up servers in minutes with my Configuration Management Tool workflows, why does it take orders of magnitude more to spin up and affect change on my Network Elements?”

Typical IT: 1 engr to 10 network devices

1 IT engr to 30,000 servers

<table>
<thead>
<tr>
<th>Year</th>
<th>Traditional IT</th>
<th>Amazon</th>
<th>Google</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>50:1</td>
<td>200:1</td>
<td>10000:1</td>
</tr>
<tr>
<td>2013</td>
<td>50:1</td>
<td>10000:1</td>
<td>30000:1</td>
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What's the challenge?
IT View: App Architect vs. Network Architect

Source (S) and Group (G) Notations:
- Source (S) = 192.1.1.1
- Receiver (G) = 192.2.2.2
- Traffic (224.1.1.1)

Diagram:
- Host A to Host B
- Host B to Host C
- Host C to Host D
- Host D to Host E
- Host E to Host F

Network Devices:
- LB (Load Balancer)
- FW (Firewall)
- MEM (Memory)
- CACHED (Caching)

Applications:
- WEB
- APP
- DB

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Challenge/Opportunity: Common Language

Developer and infrastructure teams must translate between disparate languages.

Application Architect
App Developers and Architects

Network Architect
Network Teams

Transactions
Queries
SLAs
Policies

VLANs
Subnets
QoS
Ports
Hmm... develop “hybrid” engineer?
The “hybrid” Engineer

- Programming, API, OpenSource knowledge are common themes across key technology transitions
- The ability to read and write code is not unique to a specific technology transition
- As we focus more on software, we will see a proliferation of APIs and a need to understand programming and DevOps
- An effective engineer tomorrow will have both solid networking skills as well as an understanding of programming and OpenSource technologies and more
Network Engineer Job Requirements

Global Network Engineer (Shell/Python Scripting, and Splunk), Global Network Services in Jersey City, New Jersey

Experience scripting with Perl, Python, Ruby, awk and shell strongly preferred

Network Engineer in Columbia, Maryland

THE FOLLOWING REQUIREMENTS MUST BE MET TO BE CONSIDERED FOR THIS POSITION:

- Active TS/SCI clearance
- Minimum 5 years' experience with Linux, networking and security
- Two years scripting experience in one of the following: Unix Shell, Perl, Sed/Awk
- Two years programming experience in one of the following: C, C++, Python
- Practical experience with CISCO IOS
- Practical application of encryption in a Linux environment utilizing open source tools
- Familiarity with iptables

https://www.facebook.com/careers/jobs/a0I1200000I9sg4EAB/
What skills are required?
Enterprise Architectures

Business Architecture
Governance, Processes, Org

Information Architecture
Data & Application Arch

Technology Architecture
Boxes, Tech Solutions

Systems Integration
Operations & Management
Sample Skills

- **Business Architecture**: Business Consulting, Operational Processes
- **Information Architecture**: Application Design, Systems Integration, DevOps
- **Technology Architecture**: Network Design, Network Programmability, Cloud
New Skills Required

- Business Consulting, Operational Processes
- Application Design, Systems Integration, DevOps
- Network Design, Network Programmability, Cloud

New Roles (functional)

- Business Consulting Specialist
- Operational Process/Workflow Specialist
- Systems Integration Specialist
- Application Specialist
- Product Specialist
- Architecture Specialist
Being a company where should I start?
## Evolved Skills Required

<table>
<thead>
<tr>
<th>Business Architecture</th>
<th>Operational Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Consulting, Operational Processes</td>
<td>Business Consulting Specialist</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Information Architecture</th>
<th>Systems Integration, DevOps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Design, Systems Integration, DevOps</td>
<td>Systems Integration Specialist</td>
</tr>
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</table>

<table>
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<tr>
<th>Technology Architecture</th>
<th>Cloud</th>
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<tbody>
<tr>
<td>Network Design, Network Programmability, Cloud</td>
<td>Product Specialist</td>
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Skills Evolution Roadmap

- Select leadership team to build evolution plan
  - Members from both Sales and Operations

- Define Baseline
  - Decide on roles needed to support desired business models
  - Determine time frame to meet market and customer demands

- Build Recruitment plan for missing skills/roles
  - Target Systems Integration Specialists and Application Specialists (In-Organic)
  - Provide guidance to engineering management on key skills profiles

- Enhance Existing Engineer Skills
  - Conduct engineering skills assessment “Software Skills” survey?
  - Identify current skills gaps
Skills Evolution Roadmap Cont.

• Where should I start?
  • Data Center, Cloud, SP, Collaboration, Enterprise Networking
  • Start out with your architecture of choice
  • Why? Evolve or Die: Fastest changing architecture
  • Automate Everything DevOps Expertise?

• Execute the Plan
  • Run as a dedicated program
  • Need a Program manager to execute / track
  • Possible collaboration and cross pollination with local universities

• Measure and improve the process
  • Lessons learned: what works, what doesn't
  • Incorporate and improve the overall process
  • Incorporate the other architectures
Being an engineer, where should I start?
1 Begin with End in Mind: Which Role Will You Be?

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
<th>Skills Required</th>
<th>Delivery Outcomes</th>
</tr>
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<tbody>
<tr>
<td>Solutions Architect</td>
<td>Defining solution architecture, running design workshop, gathering requirements, understanding product capabilities, roadmap and API</td>
<td>Architecture skills, industry standard understanding, consulting skill, broad knowledge of VNFs, network and solutions assessment</td>
<td>Deliver solution architecture document, design workshop, requirement, high level design, lead solution implementation, connect the dots</td>
</tr>
<tr>
<td>SDN Solution Implementation</td>
<td>Create LLD, NIP, NRFU document, running detailed design workshop, install and integrate the solutions, troubleshoot installation issues, end-end components testing</td>
<td>SDN/NFV skills necessary to perform installation of solution components, configuration of functionality, troubleshooting skills, testing skills, documentation skills</td>
<td>Deliver LLD, NIP, NRFU document and detailed design workshop. Install, configure, and test the solutions based on the NIP and NRFU</td>
</tr>
<tr>
<td>SDN Solution Development</td>
<td>Develop customization to individual components, perform unit testing, debugging and troubleshooting, Work closely with relevant Business Units</td>
<td>SDN/NFV advanced skills to install, configure and customize components of solution. Skills in programming (Python, Java, API, Web etc.) and software development with Agile/Scrum</td>
<td>Develop and perform customization in one or more solution components. Follow Cisco software development practice for any code customization in solution</td>
</tr>
<tr>
<td>SDN Solution Operation</td>
<td>Understand solution behavior, operate the solutions, optimize and troubleshoot, identification of known bugs, monitor performance &amp; behavior</td>
<td>SDN/NFV skills necessary for optimizing and troubleshooting the solution, focused on usability, operation and troubleshooting. Follow the solution development by Business Unit</td>
<td>Able to provide pro-active support of the solutions. Bridge customer and TAC Support/BU for incidents and problems. As customer advisor to optimize the solution</td>
</tr>
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</table>
2 Break It Down: Know What Makes the Solutions
3 Skill Assessment: Understand Your Current Gap

- CISCO NETWORKING
- LINUX OS
- HYPERVERSOR
- OPENSTACK
- PYTHON/SCRIPTING
- COMMUNICATION
- PROBLEM SOLVING
- BUSINESS ACUMEN
- LEADERSHIP
- GURU
4 Define Target Performance
5 Tree Traversal to Plan: Depth-first or Breadth-first
7 Get Feedback: Exam

learningnetwork.cisco.com/community/certifications/network-programmability

www.opennetworking.org/certification/skills
Can NetNuvem help?
SDNFV Baseline Enablement Program

Onsite & Remote Delivery Options

**Beginner**
- 2 Days Workshop
- Discovery
- Skills Survey
- Technology Overview

**Intermediate**
- 1 Week Workshop
- Theory
- Use Cases Creation
- Hands on Lab

**Advance**
- 2 Week Workshop
- App Development and Integration using API’s, Toolkits and SDK’s
- Use Cases Dev using automation and orchestration tools

4-8 Weeks Python Online Course With Weekly Project Meetings and Email Support
Feedback who attended the program!

“…our engineers were able to get in-depth programmatic knowledge, exposure to real-world problems they'll need to solve for customers, and the opportunity to create practices and products based around Cisco”

“…the two week workshop was the best educational experience I have had in my professional career. I am now a believer in the importance of programmability in the networks.”

“…there is an easier way to do things, rather than sticking to the tools and processes that we’ve been using for years…”
“…my perspective has been effectively changed as to how networks are built and managed in the future.”
“…I was a bit resistant in the rotation, but the benefit of learning the programmability aspect, and especially the API portion, really has woke me up…”
Key Takeaways!
Customers are at Different Points in the Journey

Many just want good network devices

Most want basic automation

Some are ready for programmatic interfaces

Everyone will move to Software Defined

Have the Software conversation
Key Takeaways

• Continue to promote learning and development of programmatic skills and build out a diverse group of “hybrid” engineers

• Continue to encourage development of programming, automation, scripting, virtual/container-ization, and Linux/OS skills across teams

• Make sure skills are being grown across technology teams

• As we have seen, these OPEN and SDNFV technologies will touch multiple areas

• Grow teams around skills (organically vs. In-organically)

• Make sure new hiring is done considering the upcoming set of OPEN and SDNFV technologies

• Not everyone needs to be a developer, but having software skill is an important asset

• Continue to fold new technology introductions into training programs
In the DevNet Zone we offer:

- **Classrooms** – learn more about about a specific topic
- **NEW! Hack, Defend and Win!** – embrace your inner hacker then defend the network! Play the Black Hat, White Hat Security Challenge
- **DevNet Sandbox** – explore free technology-packed 24x7 labs and play IoT foosball! Dig into a 5-minute mini-hack challenge or go for all 3 in 15-minutes to compete against the clock and win
- **Learning Labs** –
- **Panels** – get inspired by leading industry experts and ask your questions
- **Connected Women’s Event** –
- **NEW! Application Developer Zone and Challenge** – win a special-edition t-shirt and bragging rights by completing a learning lab, a workshop, and an application developer demo

Demos –
Come learn, play, and get hands-on with APIs and SDKs in the

DevNet Zone

LEARN  |  CODE  |  INSPIRE  |  CONNECT

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- **Learning Labs** – find an open seat to start coding in self-paced tutorials, experts are onsite to help
- **Panels** – get inspired by leading industry experts and ask your questions
- **Connected Women’s Event** – join Susie Wee on Monday for this event, then come to the DevNet Zone for an Open House
- **NEW! Application Developer Zone and Challenge** – win a special-edition t-shirt and bragging rights by completing a learning lab, a workshop, and an application developer demo

Demos – see exciting demos and partner solutions that showcase cool, inspiring solutions

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developer.cisco.com/join/CLEUR18

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Partner Booth!

Partner Booth!

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