
cisco
You make possible

Does Quantum Entanglement Mean No More Networks?

Marco Coulter, Technical Evangelist
@marcocoulter

DEVLIT-4009

cisco Live!
Barcelona | January 27-31, 2020

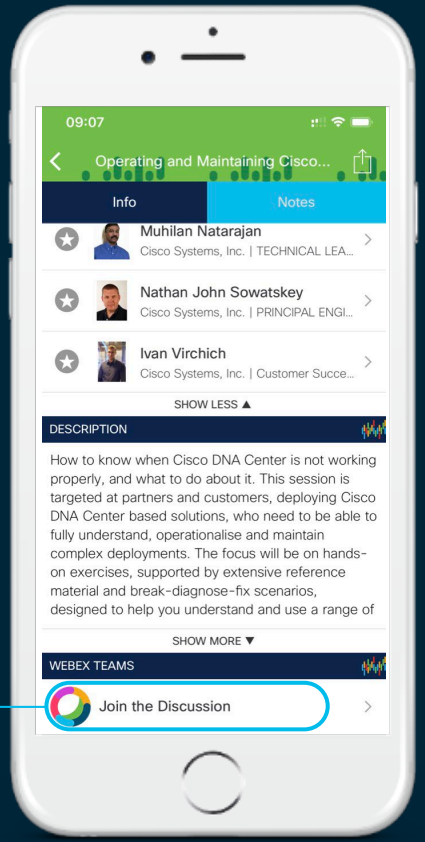
Cisco Webex Teams

Questions?

Use Cisco Webex Teams to chat with the speaker after the session

How

1. Find this session in the Cisco Events Mobile App
2. Click “Join the Discussion”
3. Install Webex Teams or go directly to the team space
4. Enter messages/questions in the team space



#about_marco

Marco Coulter
Technical Evangelist
@marcocoulter
marco.coulter@appdynamics.com

CommonwealthBank

veda
An Equifax Company

DXC.technology

ca technologies
A Broadcom Company

451 Research
NOW A PART OF S&P Global Market Intelligence

CIO FROM IDG

THENEWSTACK

Forbes

DevOps.com
WHERE THE WORLD MEETS DEVOPS

APPDYNAMICS™
part of Cisco

cisco Live!

Q: Does Quantum Entanglement Mean No More Networks?

A: NO

Thank you

WHY?

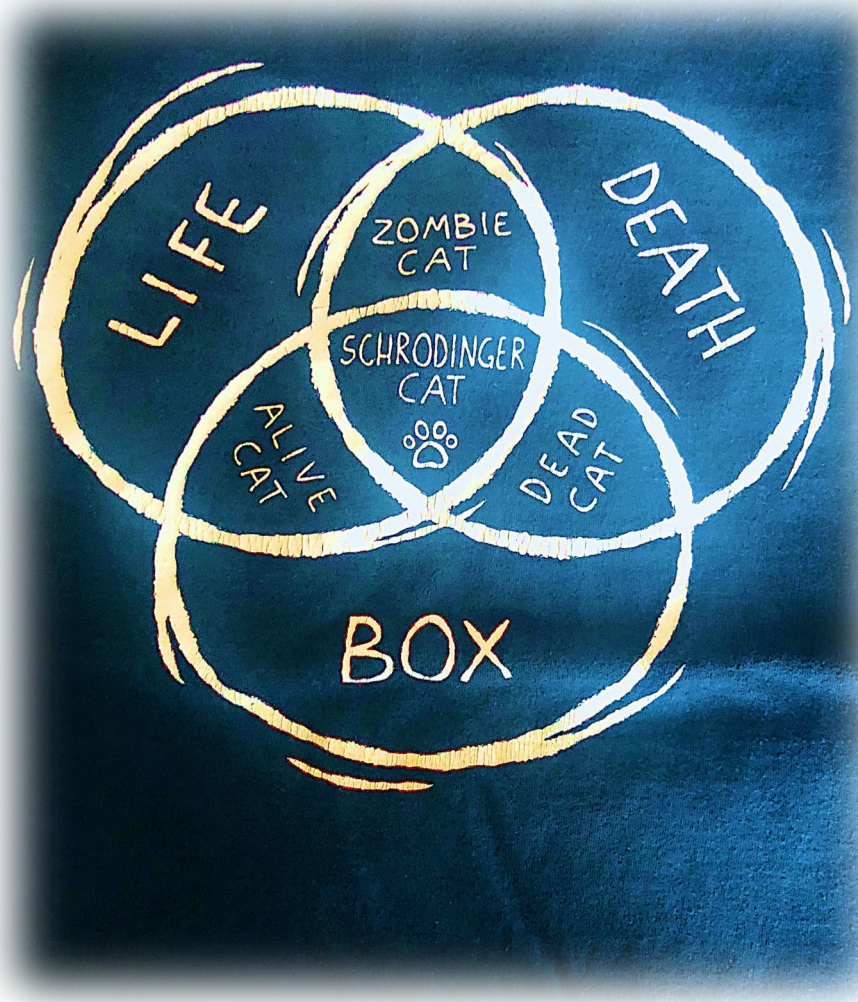
Untangling Entanglement

Quantum Timeline

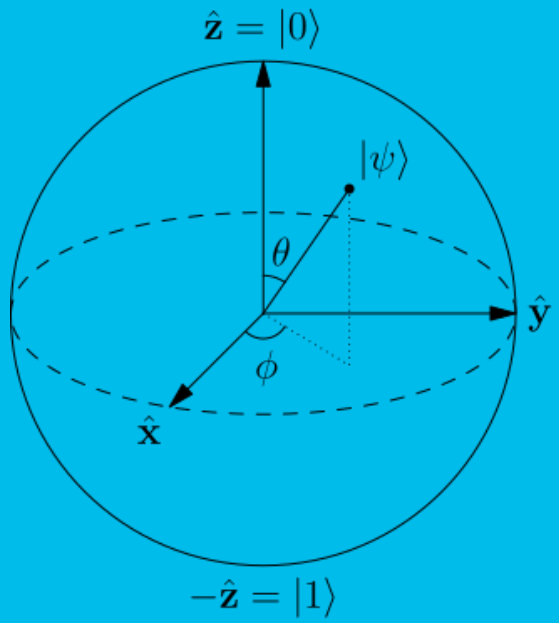
- 1901 Planck – energy is quantized
- 1935 Schrödinger – cat thought experiment
- 1936 Turing & von Neumann – machines can calculate
- 1980 Benioff – computer within quantum mechanics
- 2016 5 qubit computer
- 2019 70+ qubit Commercial quantum computer (NISQ)

Quantum Computing today is like the valve era of logic machines

Superposition



Rules of Quantum



- Qubit value of both [0] and [1] and everything in-between **UNTIL** you measure
- THEN a value of EITHER [0] and [1] **AFTER** you measure
- Measuring qubit ends quantum compute
- Cannot make copies ('no-cloning theorem')
- All operations are unitary and can be reverse-calculated (unlike classical XOR)

Image credit: https://commons.wikimedia.org/wiki/File:Bloch_Sphere.svg

Classical vs Quantum

Classical:

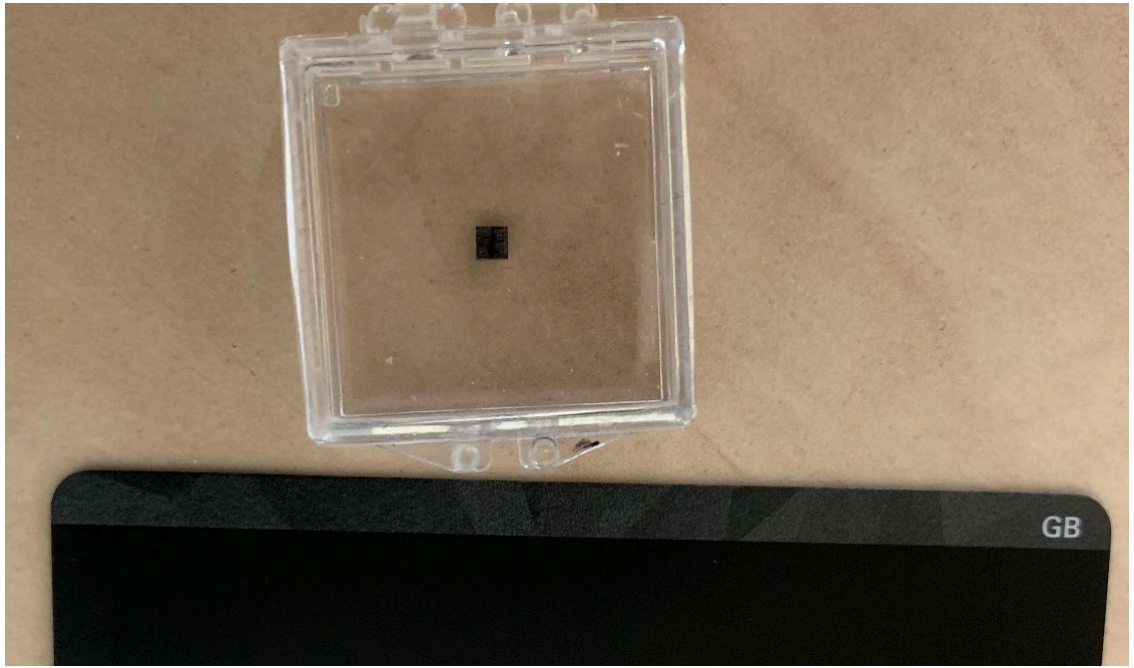
- Deterministic
- Know the values at each step of the program
- Get a definite answer
- 1,000,000,000,000 binary bits
- *Faster* Operation Speed
- Cracking RSA
  - 28,000,000,000,000,000,000,000 years

Quantum:

- Probabilistic
- Cannot know intermediate values in the program
- ONLY the probability of the answer
- 40 qubits
- *Slower* operation Speed, BUT Parallel
- Cracking RSA
  - 100 seconds

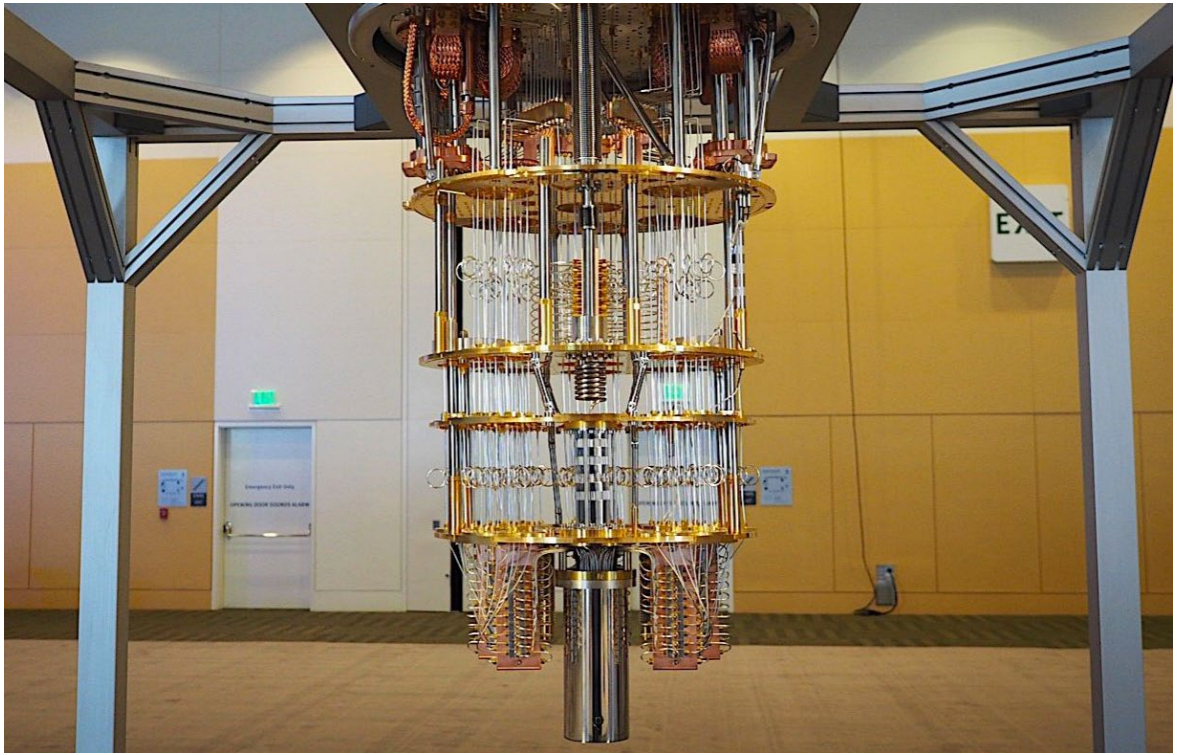
Quantum Qubit

credit card for scale due to absence of bananas



So when do I get my Quantum Smartphone?

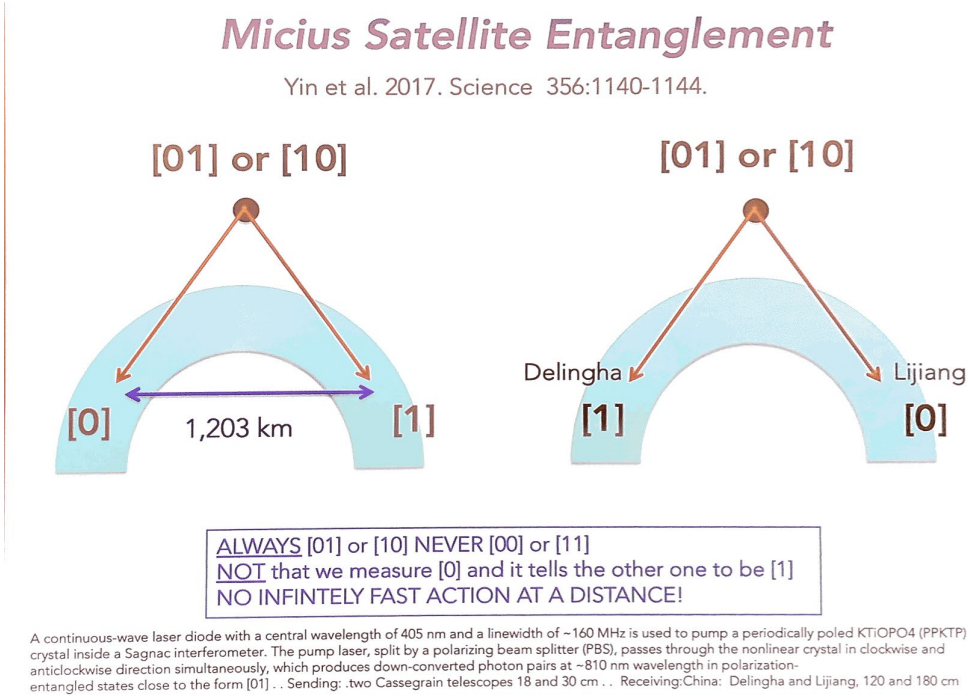
15 millikelvins Means No Quantum Smartphone



Entanglement

Image credit: Wikimedia Commons user David Koryagin, under c.c.a.-s.a.-4.0.

Micius Satellite Entanglement



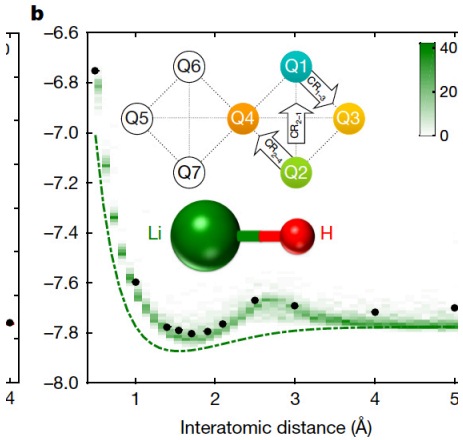
Network Needs

What is the One Capability Needed for Networking?

COPY

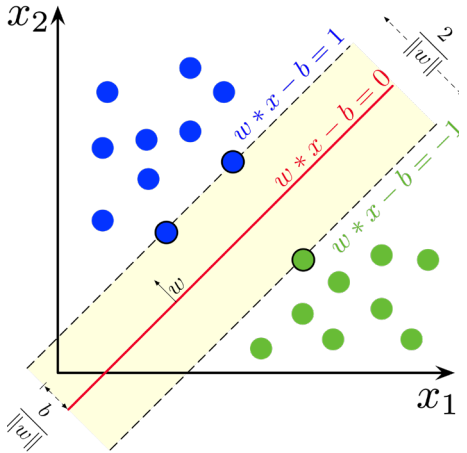
Quantum Reality

Use Cases



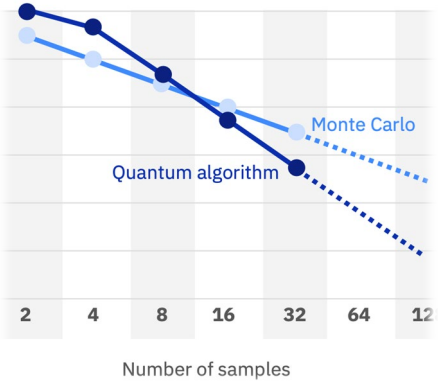
Molecular Structure

Design Optimization

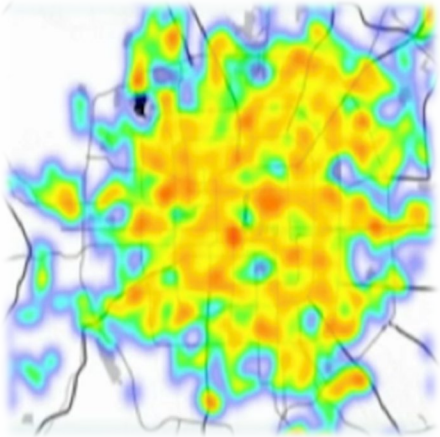


Machine Learning

Use Cases



Finance

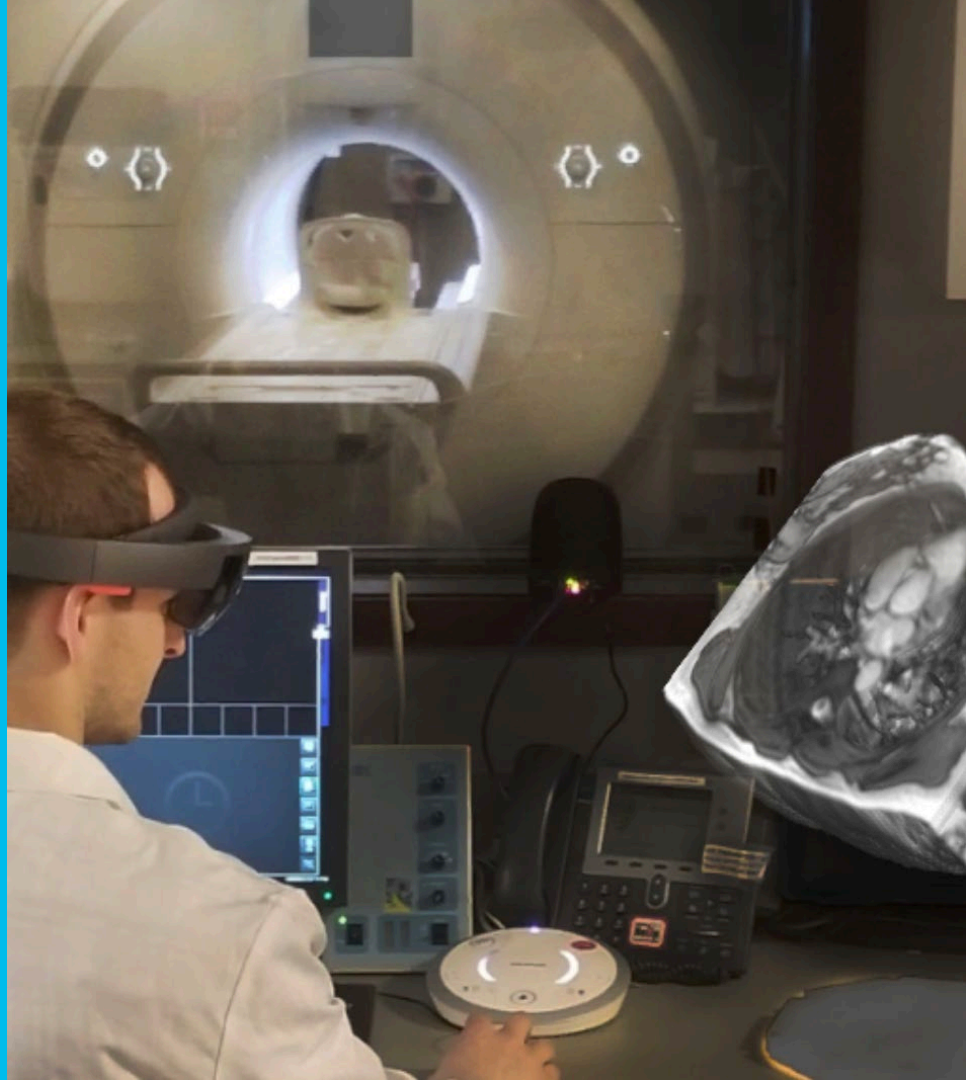


Logistics

Cryptography

Real World Benefits

- Case Western Reserve University & Microsoft
- 300% faster scans
- 30% better fingerprinting



What's Next?

- Quantum 'sidecars' for classical computing
- Quantum Supremacy needs reliable error correction
  - (maybe topological QC?)
- ACTION: If you create/update algorithms today, monitor this space.
- Hire PhDs

Places to find out more

- https://quantumweekly.com
- https://quantumcomputingreport.com
- https://techwhisperernyc.com/quantum-computing-research/
- https://www.ibm.com/quantum-computing/technology/experience/
- https://github.com/Qiskit/qiskit-terra

Questions???

- Quantum ‘sidecars’ for classical computing
- Quantum Supremacy needs reliable error correction
  - (maybe topological QC?)
- ACTION: If you create/update algorithms today, monitor this space.
- Hire PhDs
- *Join the WebEx*
- *Make me better – please complete the survey*

Learn more about the new DevNet Certifications and how you can prepare now!

	Associate Level	Specialist Level	Professional Level	Expert Level
Engineering				
Software				

Future Offering

Start Here | Upcoming Cisco DevNet Certifications

- Start at **Meet DevNet**

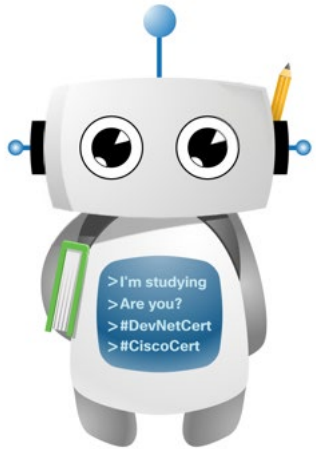
  DEVNET-2864: Getting ready for Cisco DevNet Certifications
  Offered daily at 9am, 1pm & 4pm at Meet DevNet

- Attend a **brownbag session**

  DEVNET-4099: DevNet Certifications: Bringing software practices & softw
  to networking
  Offered daily 12:15-12:45 in the DevNet Zone Theater

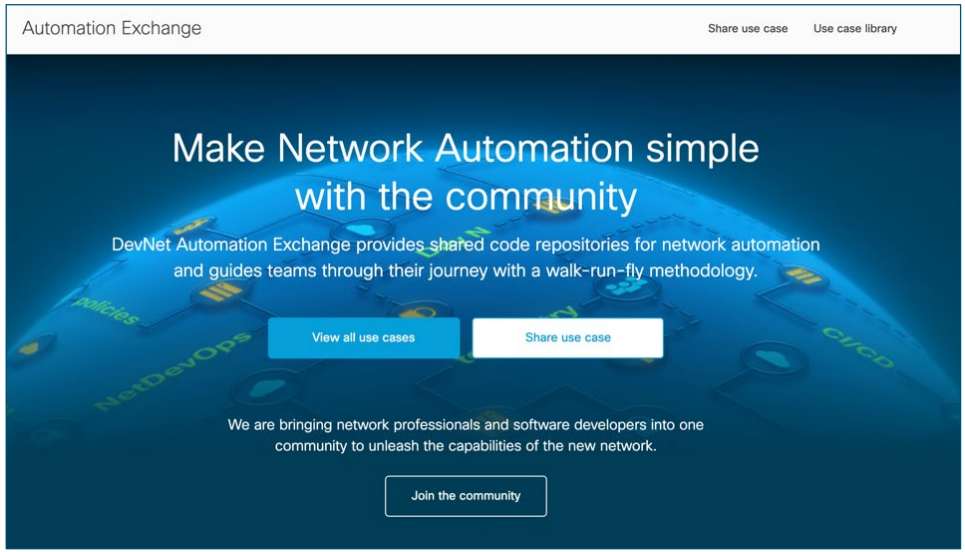
- Visit the **Learning@Cisco** booth

- Scan this code to **sign up** for the latest updates or go to
  http://cs.co/20eur02



Find shared code repositories of use cases for network automation & more

Don't miss our 5 Automate Infrastructure demos in the DevNet Zone!



Scan this code or go to the URL to **learn more**

http://cs.co/20eur01

Start at **Meet DevNet**

DEVNET-3010 [a-j] Learn how to make Network Automation Simple with the Community

Offered Monday 2pm & 5pm, Tuesday & Wednesday 10am, 2pm & 5pm, and Thursday 10am & 5pm at Meet DevNet

Continue your education

Demos in the Cisco Showcase

Walk-In Labs

Meet the Engineer 1:1 meetings

Related sessions

Thank you

You make **possible**