Learnings from running a free public cloud for 10 Years

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Agenda

- Context
  - What is the Rapid Access Cloud?
  - Who is Cybera?
- What did we learn?
- Q&A

Slide apology

- My slides aren't pretty
- Slide link if you're curious
  - Not a rick roll :-)

What is the Rapid Access Cloud?

What is Rapid Access Cloud?

- Started in 2012 - "What happens if we give folks free compute"?
- OpenStack based cloud free for Albertans to use
- For **non-production** workloads and education uses

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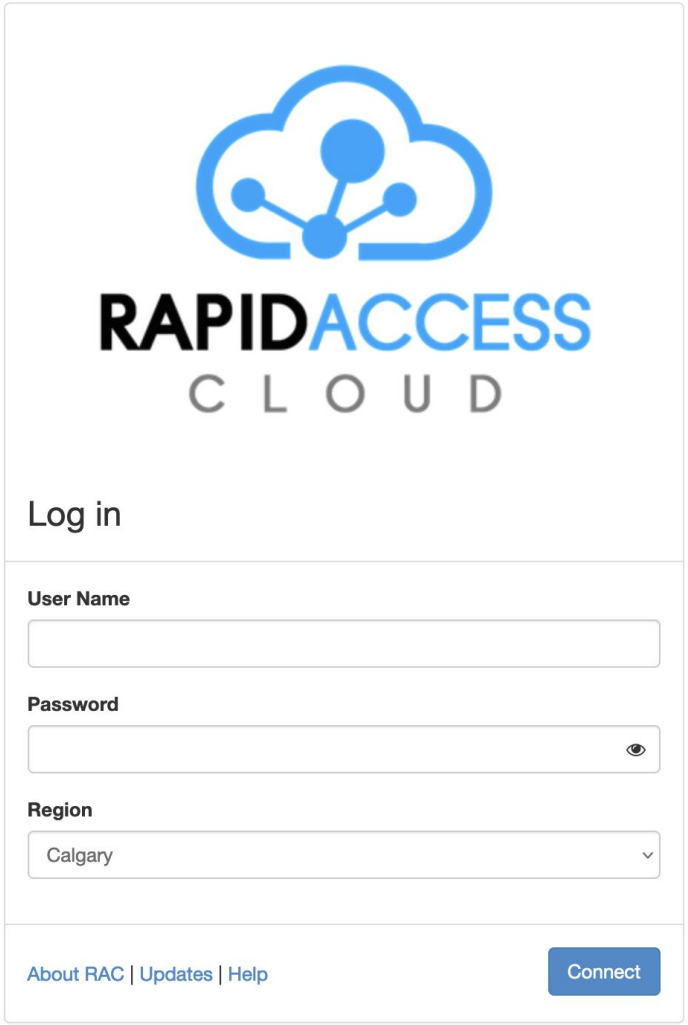
RAPIDACCESS
CLOUD
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About RAC | Updates | Help
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Project
Compute
Overview
Instances
Volumes
Images
Key Pairs
API Access
Network
Orchestration
DNS
Object Store
RAC
Identity

Overview

Limit Summary

Instances

Used 6 of 100

VCPUs

Used 11 of 150

RAM

Used 15GB of 1000GB

Floating IPs

Used 3 of 10

Security Groups

Used 13 of 20

Volumes

Used 10 of 75

Volume Storage

Used 635GB of 1.5TB

Usage Summary

History in a Hurry

- 2012 - Started with a controller from Nebula and a handful of compute nodes
- 2014 - Recreated with our own deployed controllers and nodes in both Edmonton and Calgary
- 2016 - In conjunction with CANARIE, started incorporating GPUs
- Has grown to ~1700 cores, 12TB of RAM, and ~90 TB of object storage space available to use.

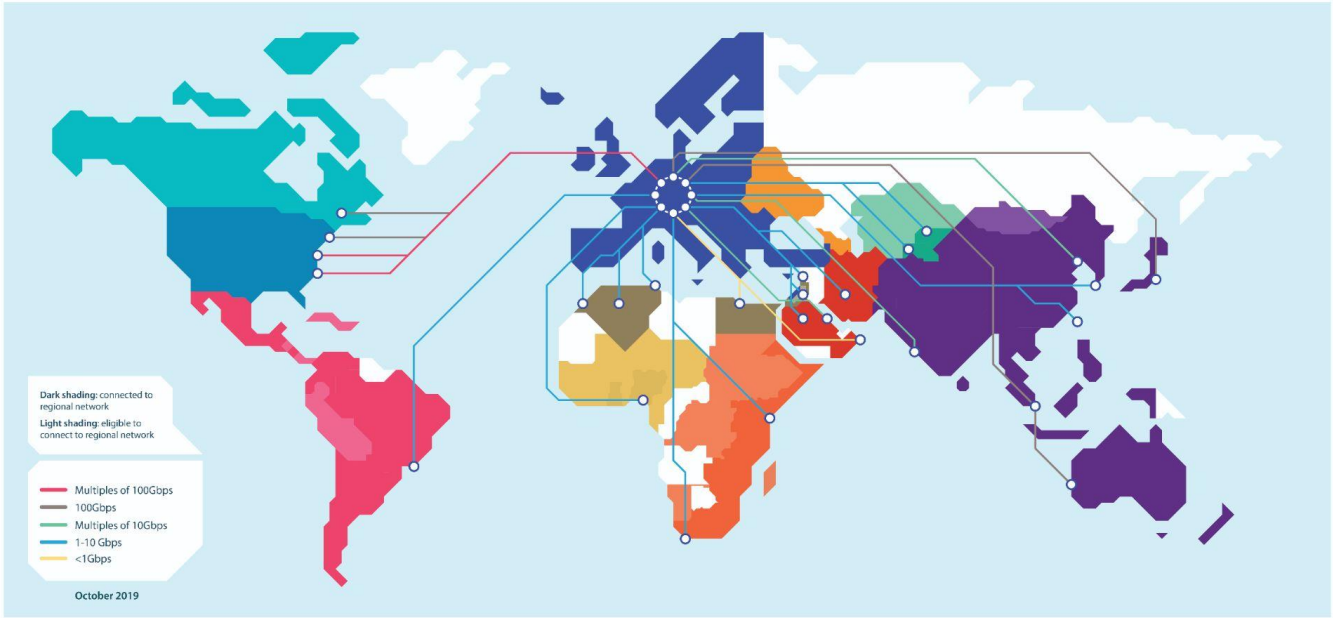
But who is Cybera?

HOW CYBERA SUPPORTS ALBERTA'S PUBLIC SECTOR

What We Do


Yukon University
AURORA COLLEGE
NUNAVUT ARCTIC COLLEGE
canarie
BCNET
cybera
MRnet
ACORN-NL
SRNET
ORION
risq
ECN
ACORN NOVA SCOTIA
to Asia Pacific
to CERN and Large Hadron Collider
to the Americas and Europe

AT THE HEART OF GLOBAL RESEARCH AND EDUCATION NETWORKING



Canada & USA | Latin America | Europe | North Africa & Eastern Mediterranean | West & Central Africa | Eastern & Southern Africa | Central Asia | Asia-Pacific | Other R&E Networks

CANARIE · ESnet · Internet2 · CLARA · GÉANT · EaPConnect · ASREN · UbuntuNet Alliance · CAREN · TEIN

GÉANT Networks · Services · People

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Also Other Services

- Shared procurement
- Internet Buying Group for K-12 school boards in the province
- Data Science Training and Programs
- Callysto (Jupyter Notebooks and Curriculum for Grade 5-12)

What'd we learn?

Are you an OpenStack admin or ???

- Dependency Management - Day 2 doesn't mess around.
  - MySQL clusters
  - RabbitMQ clusters
  - Human processes
  - Abstraction management

Are you an OpenStack admin or ???

- Complex systems tend to... get more complex.

- What would you say to how a failing hard drive in Edmonton led to a Calgary network outage?
  - Root Cause Analysis is useful - but not the end of the story. It's also a useful way to lie to yourself.

Are you an OpenStack admin or ???

- OpenStack is Python "glue" on top of known technologies
  - Libvirt/KVM
  - iSCSI
  - Linux Bridging

- Metrics and GUI apps are awesome
- strace, tcpdump, sar, and nc get the job done

IP Addressing

- RAC offers public IPv4 AND IPv6 addresses

- You can never have enough IPv4 addresses and there are not enough.
  - One class of 150 CompSci students can burn through your address pool real fast

IP Addressing

- IPv6 scares folks - because change is scary.
- IPv6 adoption in Alberta is... not great.
  - TELUS - supposedly on every home connection
  - Shaw/Rogers - some modems but not all
  - Everyone else - mixed bag if it's turned on
  - Universities - very slow
  - Supernet - still doesn't support it at all.

"Free" is hard

- How do you keep support manageable?
  - Documentation!
  - Expectations

- How do you keep resources available?
- How do you handle that you've removed the market force to encourage less waste?
  - Do you actually see more experimentation with the constraint removed?

"Free" is hard

- What is the operational tradeoff?
  - Hardware ages. Hardware breaks. Software needs updates.
  - GPUs just keep getting more expensive each year

Community is priceless

- OpenStack Foundation did a good job fostering and creating communities
  - Mailing Lists
  - IRC
  - Conferences
- Global - we're worked with folks all over the world with it

- One of my favourite sayings from Kubernetes folks was "how do we not repeat OpenStack's mistakes?"

Containerization is awesome

- Not exactly new in 2014, and definitely not new now BUT
- It’s a fantastic approach operationally.
  - Solved a lot of issues of running several Python services along side and avoiding conflicts between versions.

- Embracing CI/CD is "easier" with containers

Abuse

- Far less common than you may presume
- Far less common != not at all
- Attacks targeting bad configs on the cloud are a much bigger deal.

What'd we learn?

- Trust in humanity - people will surprise you.

- Trust but verify.
- Design for people - making things secure, private, the default and easy option pays off.

Importance of Self Hosting - Services

- Commodity level services is a hard sell
  - Email - most of our email is already on Google or Microsoft's servers.
  - Anti-spam and dealing with blacklists is hard.

- Services that are latency sensitive, or key to the business
  - File Sharing (eg. documents, video)

Importance of Self Hosting - Infrastructure

- Cloud services can get expensive quickly.
  - The tradeoff is real - not needing to manage your hardware and have the elasticity is fantastic. Unless you don't need those features.

What did we get wrong about self hosting?

- The desire to avoid managing hardware is bigger than we thought
  - People not interested in hardware.
  - Changing dead hard drives is tedious and not fun.
- Underestimating the value of outsourcing "the hard bits"
  - Physical security, data protection certifications

What things surprised you?

- Minecraft Servers
- OwnCloud

Network Virtualization

- Just like how physical compute hardware was moved, people want to move network devices as well
- NFV is even more selective about it's location
  - Similar to how compute is best placed close to your data
  - So for us - virtual firewalls for members makes sense.

- The network path is everything (YYCIX shoutout)

"Cloudy" is hard

https://xkcd.com/1053/

"Cloudy" is Hard

- Our users tend to be very new to the "cloud"
- Word of mouth or post secondary students/researchers
- Hardware Requirements != Cloud Requirements

- How do we better help those new to cloud, or even new to using a hosted services use them more effectively?

Fads

- We'd love to better identify passing fads versus industry changing

- What we do know
  - If the change doesn't noticeably (10x rule of thumb) improve things it's not worth the change
- But what do we know really?
  - The old will be new again as folks reinvent or try previously tried approaches to new or even similar problems.

The Future of RAC

- We can not, should not, and are not interested in competing with AWS, Azure, or GCP.
- Is there still a place for this when the big 3 have free tiers?
- We don’t know for sure - but we do know for static workloads, self hosting outweighs cloud costs.

Thank you!

Questions? Contact rac-admin@cybera.ca

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