WIND

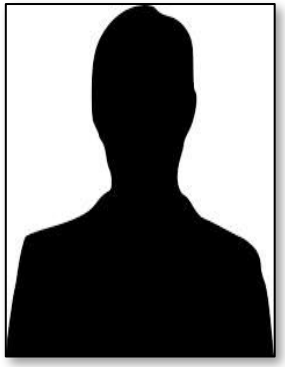
Edge Computing Operations:
Day-1 Deployment & Day-2 Management

Titanium Cloud

Brent Rowsell & Greg Waines
(Wind River Systems)

WHEN IT MATTERS,
IT RUNS ON WIND RIVER.

Who we are



Brent Rowsell

- Principal Architect of Titanium Cloud,
- Wind River's Lead Project Member in StarlingX,
- Working with OpenStack since 2013,
- 25+ years of Telecom Experience.

Greg Waines

- Senior Architect of Titanium Cloud,
- Member of StarlingX Project,
- Contributing to OpenStack Vitrage and OpenStack Masakari,
- Working with OpenStack since 2013,
- 25+ years of Telecom Experience.

Our software has been deployed in over ***2 billion devices***; into environments, systems, and applications subject to the highest standards of safety, security and performance.

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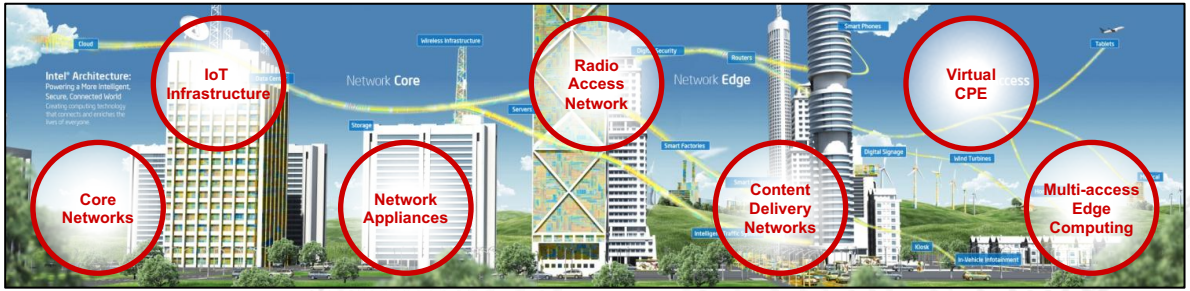
Wind River® Titanium Cloud Addresses Key Challenges

Telco Infrastructure



- Proven, integrated virtualization platform saves Time-To-Market
- Delivers latency, resiliency and performance for Edge use cases
- Streamlined installation, commissioning and maintenance
- End-to-End security and ultra-low latency for Edge applications
- Full support for multi-layer HW and SW decoupling

Infrastructure
OPNFV VERIFIED
2018.01

Energy

Smart Buildings

Manufacturing

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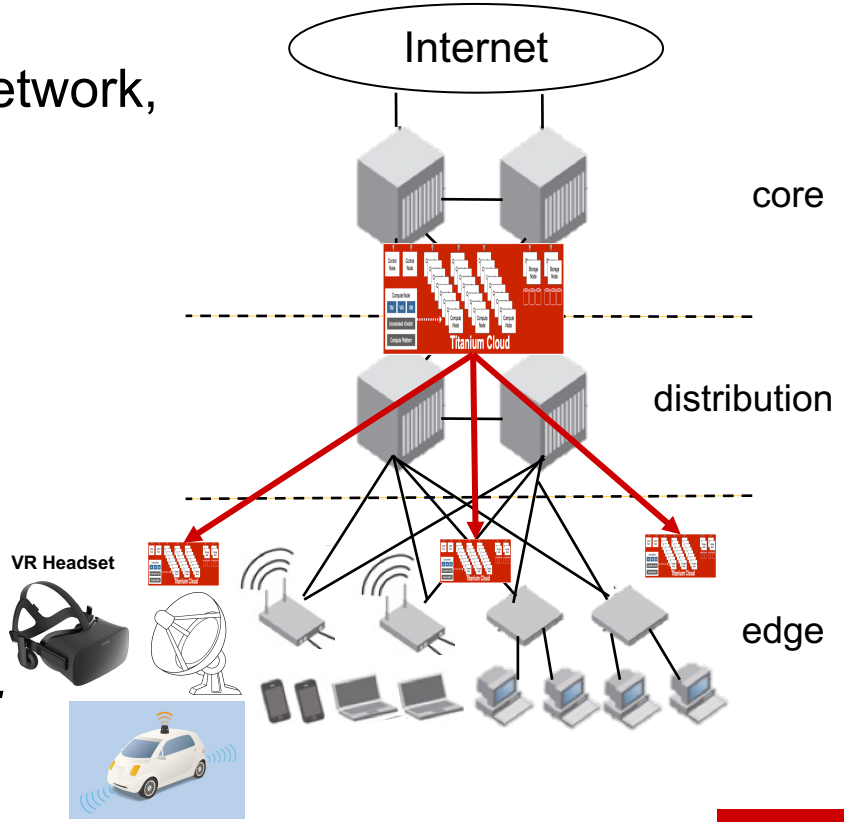
Introducing StarlingX

- StarlingX is a new project being hosted by the OpenStack Foundation
- Formed with seed code from the Wind River Titanium Cloud portfolio
- Project will provide a fully integrated openstack platform with differentiators for high availability, Quality of Service, performance and low latency needed for industrial and telco use cases
- Aligned with the OpenStack Foundation Edge Working Group and the Linux Foundation Akraino Edge Stack

Edge Computing

- Extending the cloud to the edge of the network, near the source of data,
- Reducing the latency between ‘cloud services’ and ‘end-user devices’,
  - Cloud Computing,
  - Cloud Storage,
  - Cloud Networking.

➔ ***Enabling new genres of applications.***



Titanium Cloud – ***Distributed Cloud Project***

Part of **StarlingX** Project

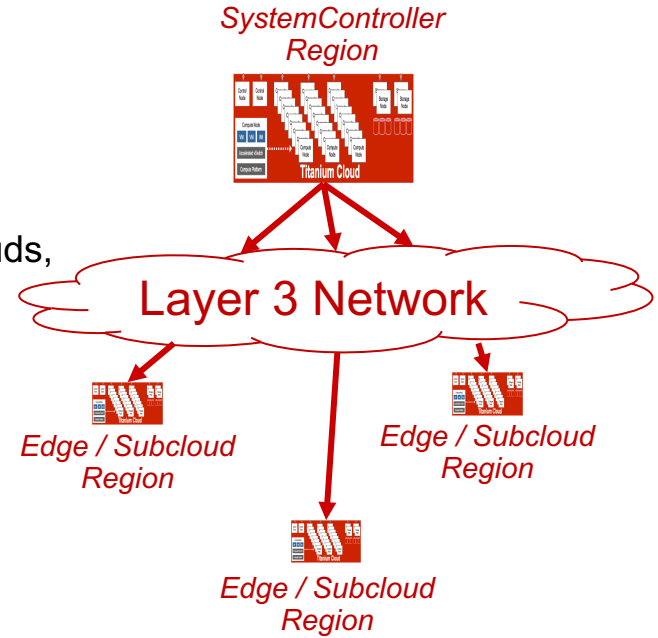
Objectives:

- ***Centralized Management*** across *all* Edge Subcloud Deployments
- ***Zero Touch Provisioning***
  - Day-1 Edge Subcloud Installation and Commissioning Simplicity
- ***Single Pane of Glass***
  - Day-2 Centralized Management of System-Wide Configuration across *all* Edge Subclouds

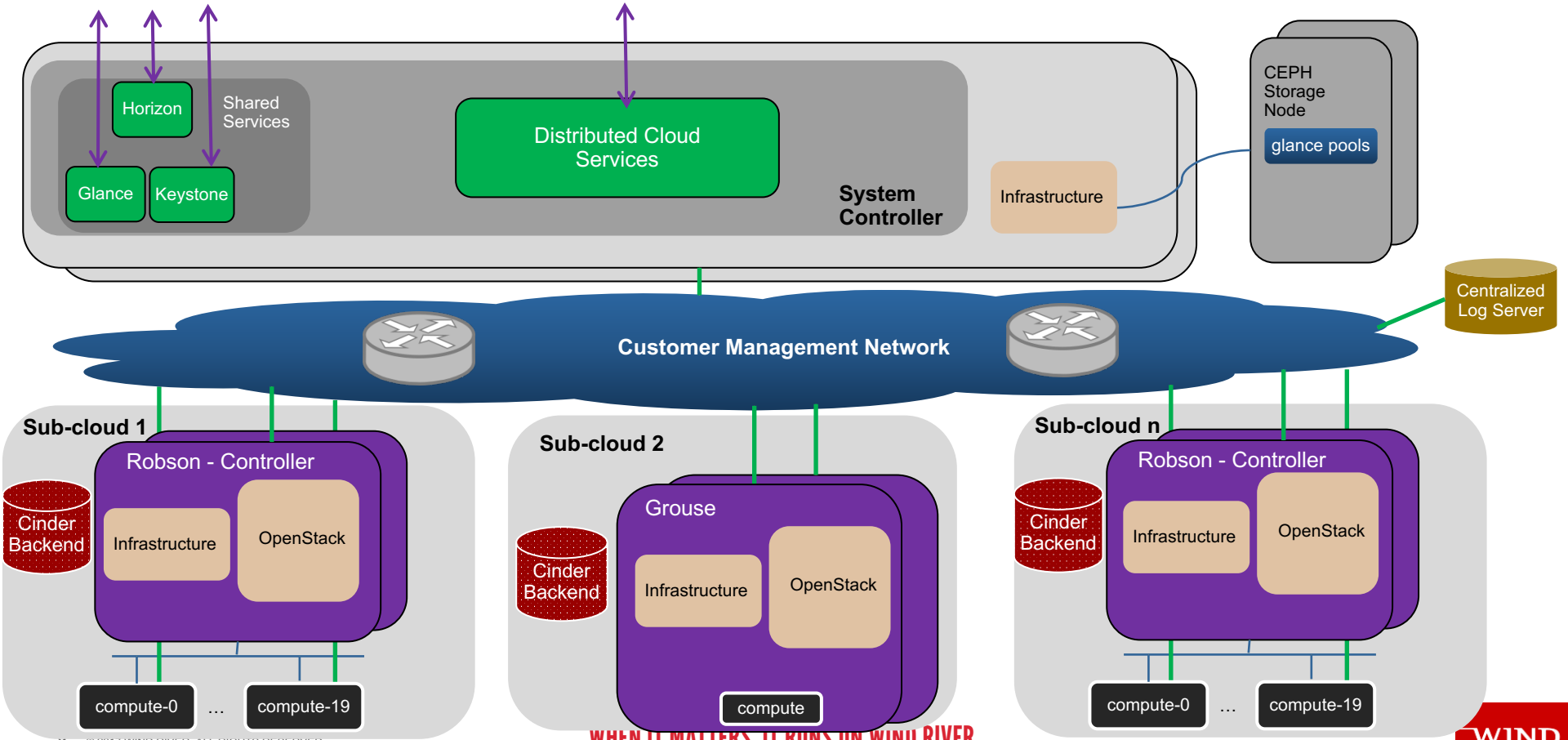
- Scale to Large Number of Edge Subclouds,
- Scale Edge Subclouds both Small (i.e. Single Server) and Large (i.e. 100s of Servers),
- Maximize Edge Subcloud autonomy when communication to central control is lost.

Distributed Cloud - Solution Overview

- Based on OpenStack Regions,
- Central SystemController Region:
  - Hosting Shared Services and
  - System-wide Infrastructure Orchestration functions:
    - Deployment and Management of Subclouds,
    - Configuration portal for shared configuration across all Subclouds,
    - Fault aggregation,
    - Patching orchestration.
- Remote Edge / Subcloud Regions:
  - Geographically dispersed,
  - Connected via L3 network,
  - Running reduced Control Plane.
- Inter-Region Communications strictly REST APIs / L3.

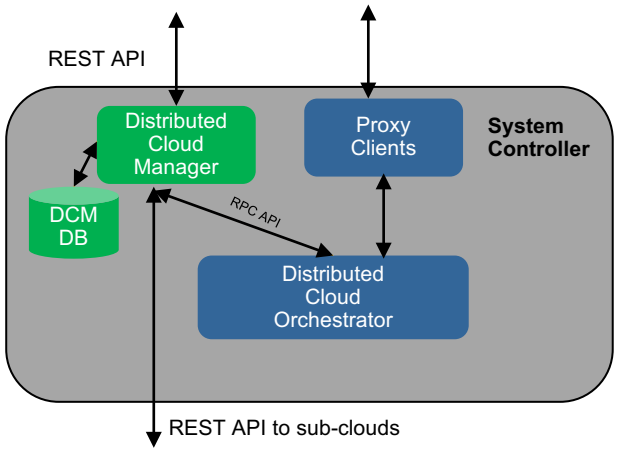


Distributed Cloud Project - Architecture



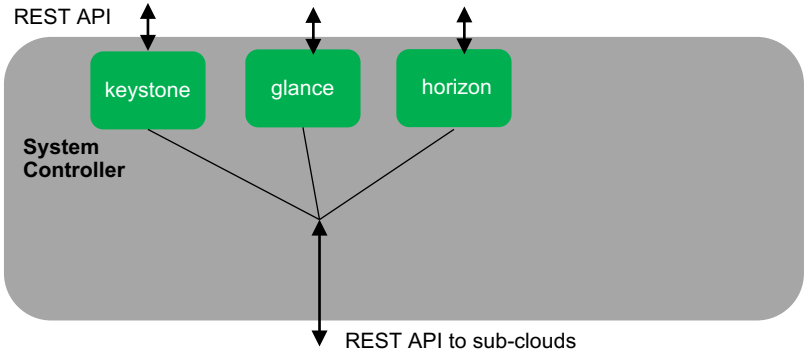
Distributed Cloud - Manager

- CLI/REST API to add/delete/modify/query Subclouds
- Manages Subcloud configuration and status
  - Configuration: name, management subnet, etc.
  - Status: availability, sync status, etc.
- Provides administrative commands to manage/unmanage Subcloud
- Manages alarms for Subcloud availability
- Audits Subclouds to determine overall availability status
- REST API for system wide patch orchestration



Shared OpenStack Services

- Keystone
  - Centralized Project and User Management,
  - Future Blueprints:
    - Distributed across all Subclouds,
    - Centralized configuration portal and synchronization across all Subclouds.



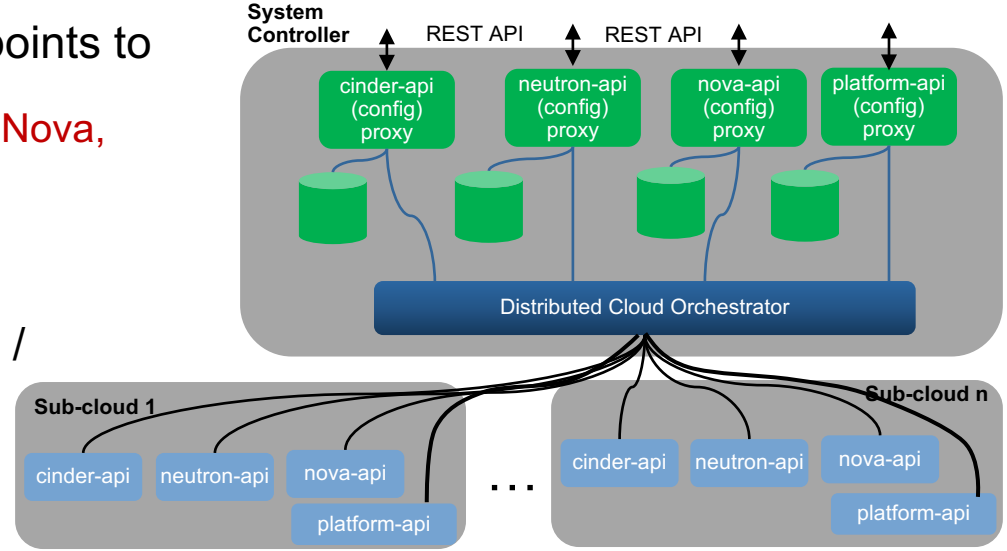
- Glance
  - Centralized image management,
  - Partially distributed solution;
    images are cached in Subclouds, reducing latency impact.
  - Future Blueprints:
    - Distributed across all Subclouds,
    - Centralized configuration portal and synchronization across all Subclouds.

- Horizon
  - Single Central Horizon instance which can switch between Subcloud contexts.

Distributed Cloud – Orchestrator: Synch Shared Config

- SystemController exposes external endpoints to provision
  - synchronized **OpenStack** configuration for Nova, Neutron and Cinder,
  - Synchronized **Infrastructure** configuration.

- Configuration updates made on the SystemController are applied to all Edge / Subclouds,
- As part of Edge / Subcloud Installation, synchronized **OpenStack** configuration is *automatically* applied.



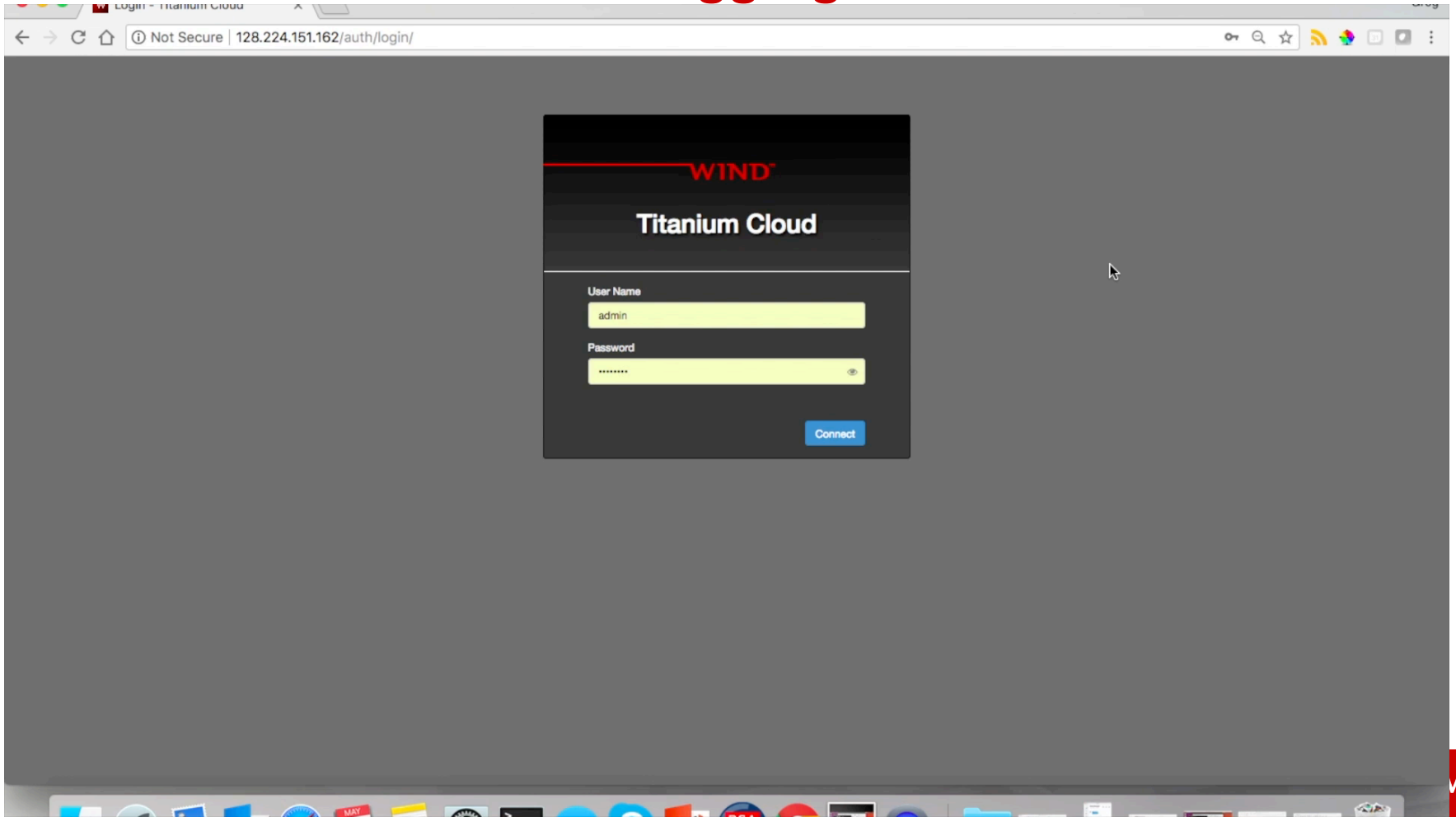
Openstack Resources Synchronized:

- Nova: flavors, flavor extra-specs, keypairs, quotas
- Neutron: security groups, security group rules
- Cinder: quotas

Infrastructure Resources Synchronized:

- DNS IP addresses
- NTP IP addresses
- OAM Firewall settings
- SNMP community and trapdest settings
- Remote logging settings

Distributed Cloud - Alarm Aggregation & Subcloud Status



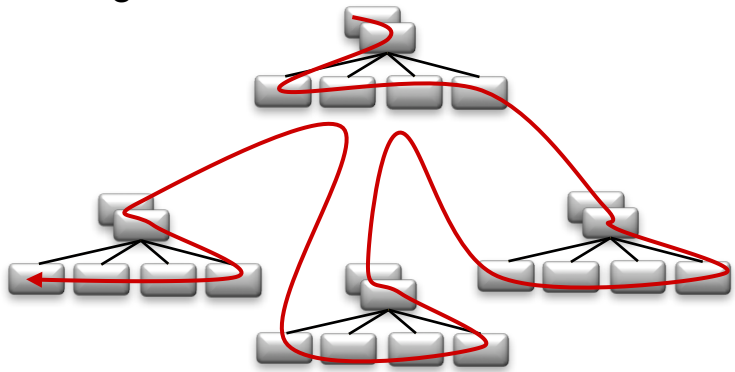
Distributed Cloud - Software Patching Orchestration

- Patch == Software Update containing Bug Fixes and/or New Features.
- Orchestrate the application of software patches *across entire distributed cloud*.

- Applies Patch to SystemController Region first
  - *Automatically* iterating through all nodes of SystemController Region,

  ... and installs patch(es).
- *Automatically* ***recursively*** iterating
  - Through all Edge / Subcloud Regions,
    - And through all nodes in each Edge / Subcloud Region

    and installs patch(es).
- *Automatically* migrates VMs throughout procedure.



- A ***MUST*** for Edge Computing Systems
  - Improvement in usability of applying patches
  - Improvement in time to apply patches

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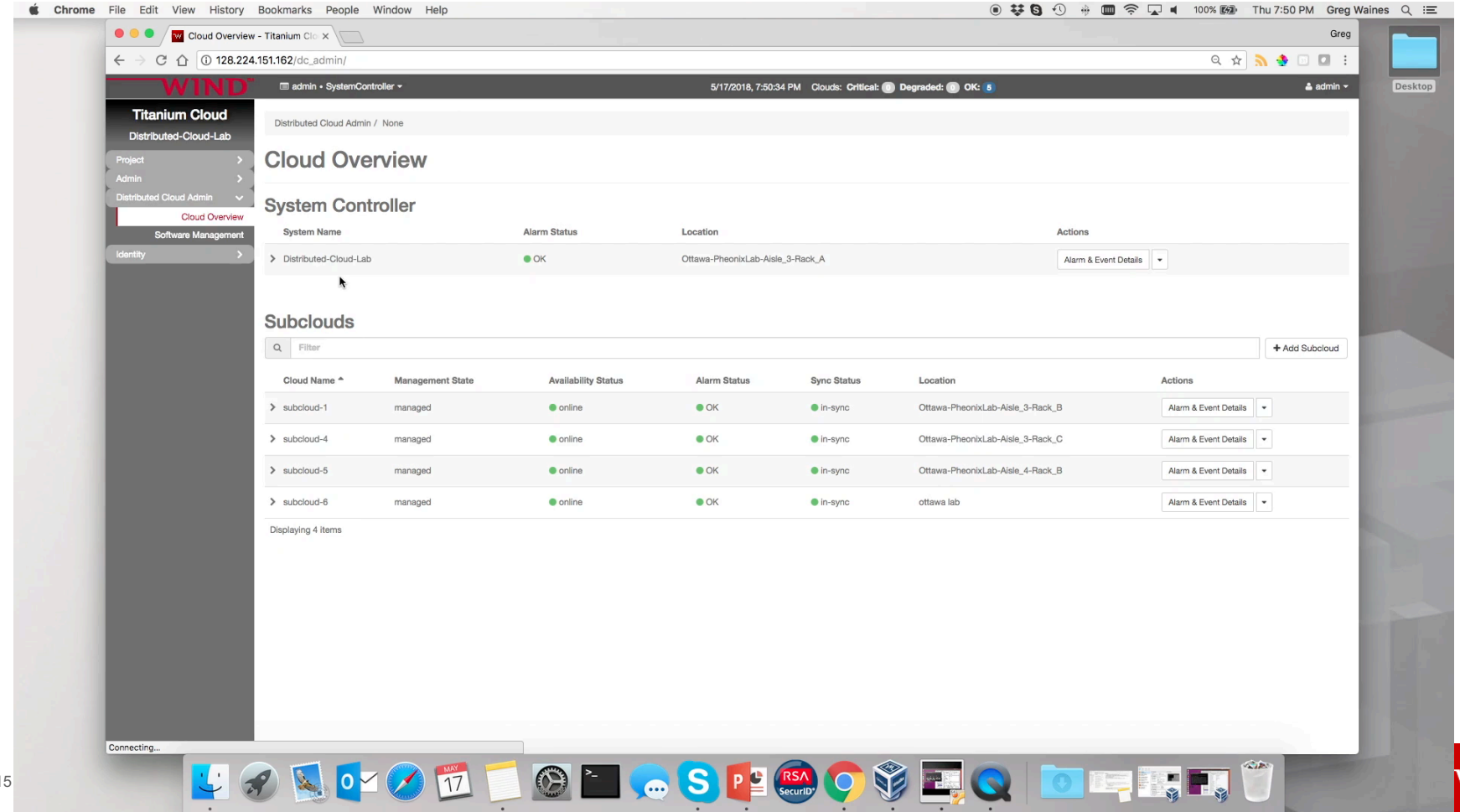
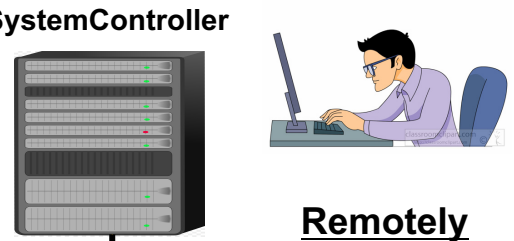
Distributed Cloud - Software Patching Orchestration



Subcloud ZTP Installation



At remote site

1. Server(s) are physically installed
   - TOR cabling, config and verification
   - BMC cabling, config and verification
2. Power up first controller
3. Load is installed on the first controller
   - Installation options:
     - USB stick
     - Pxeboot server on customer network
     - Staged prior to delivery to remote site
     - Login and set initial wrsroot pw

Remotely

1. Via remote BMC console, run pre-bootstrap utility
   - Sets up basic network connectivity
2. Add & Configure Subcloud via GUI,
3. Generate '*bootstrap configuration file*', Transfer to the Subcloud,
4. Run '*config_subcloud*' bootstrap wizard,
5. Select '*Manage Subcloud*' to synchronize shared data to Subcloud.

➔ *Subcloud is ready for workloads.*

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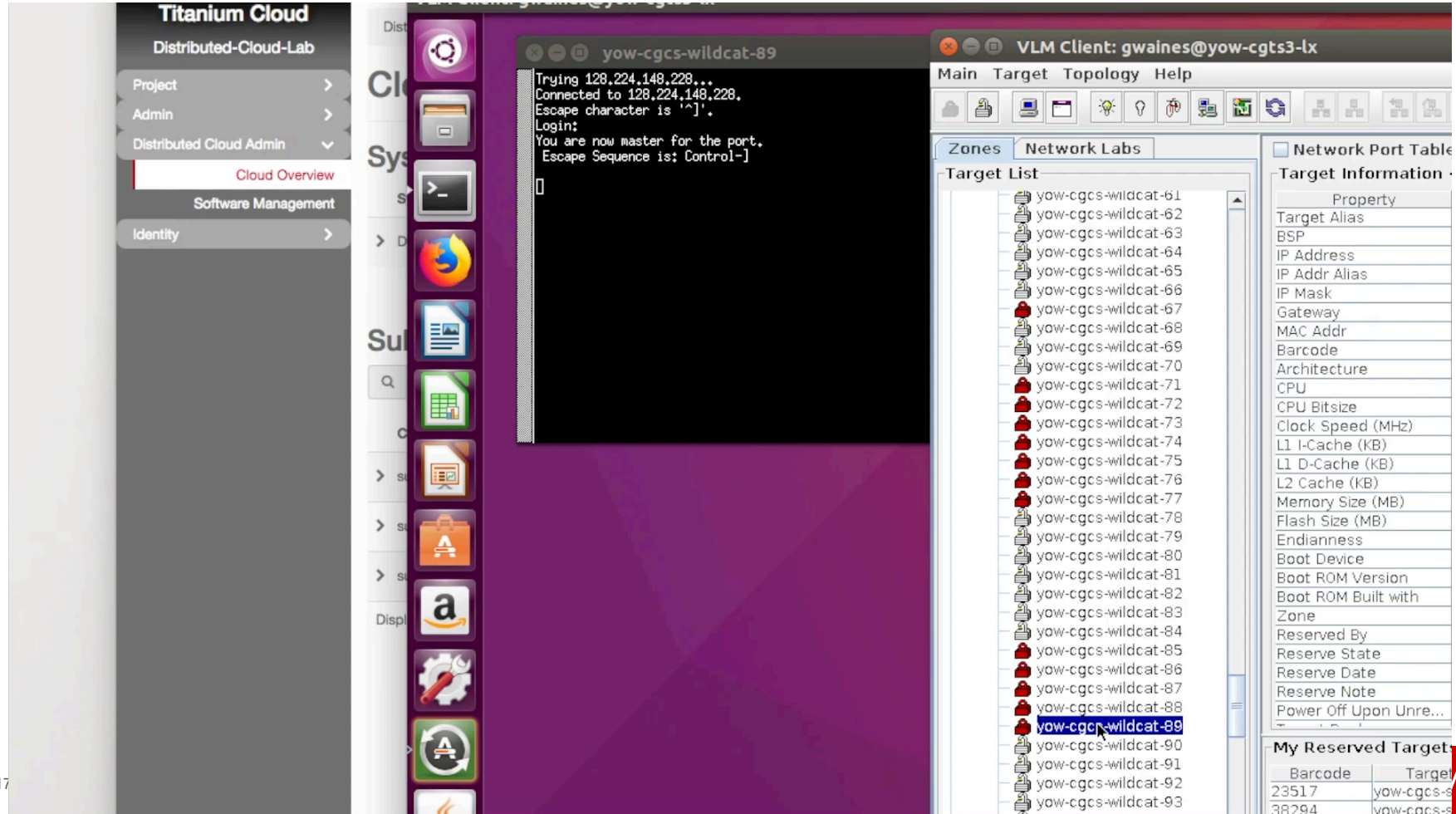
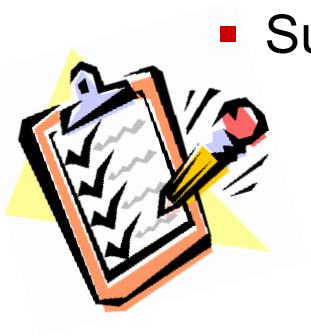
Subcloud ZTP Installation



Summary and Next Steps



- Summary:
  - Synchronization of OpenStack & Platform configuration & quotas across Subclouds,
  - Fully Automated Orchestration of Patches across Subclouds,
  - Aggregation of Alarms across all Subclouds,
  - ZTP Installation of Subclouds.

- Future Blueprints:
  - Distributed Keystone for scalability and Subcloud autonomy,
  - Securing Inter-Region Communications,
  - Fully Distributed and Synchronized Glance,
  - Synchronization of Configuration to ‘selected’ Subclouds,
  - Inter-Subcloud VNF Lifecycle Management,
  - Geo-Redundant SystemController,
  - Upgrade Orchestration.

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