The New Economics for Data Center Infrastructure: RackN Automation Improves Speed and Agility by Reducing Cost and Risk.
Executive Summary

RackN’s mission is to fix the current lack of fast, simple and standard ways to manage fundamental data center infrastructure activities. These include updating server firmware, operating systems and integrating provisioning into application life-cycles. RackN on-premises software integrates easily with existing processes while providing a clear path from home-grown scripting to common best-practices. RackN customers achieve a 10x performance improvement by automating provisioning and orchestration. Like any building activity, a solid foundation makes the entire stack more robust and secure.

Introduction

We believe that scale commodity and edge infrastructures can be fully automated without creating a matching dedicated support staff.

At RackN, our mission is to redefine physical infrastructure automation to make it highly repeatable and widely consumable in the same way that cloud has changed infrastructure.

Simplicity of use, more than any other benefit, is the key operational requirement to achieve our mission. Data centers are necessarily complex, evolving and heterogeneous; consequently, the foundation of all efforts must be simple, fast and flexible. These benefits translate directly into open and reusable best practices because operators can easily understand and share automation. Finding this balance represents a significant engineering investment by the RackN team.

Why invest in automated physical provisioning before layering platforms on top? As the bottom most layer of IT infrastructure, it drives the quality, control and resilience of everything built above it. The pace of innovation means that operators must be ready to constantly change: this includes being able to update every infrastructure layer. The industry has overlooked infrastructure automation and tolerated expensive, fragile data centers because it was very hard to automate. Until now.

This brief explains how RackN delivers robust data center automation via open Digital Rebar Provision scaffolding with integrated RackN packages.

Digital Rebar Provision is an on-premises provisioning service that has been extended to include a complete physical infrastructure life-cycle platform. For more information about the Digital Rebar architecture, we suggest reading the RackN “Building Infrastructure in Layers” white paper.

Audiences

While this brief targets Executives and IT Directors looking to improve Infrastructure Operations Management Process and Tools, we specifically address topics relevant to many other roles surrounding data center performance.

Improving data center ROI requires systemic change and leadership across many disciplines. This type of thinking, often called DevOps or Lean process, requires understanding how different roles must collaborate. For this reason, this brief includes discussions about Operator, Site Reliability Engineer, CIO roles as well as external Systems Integrator and Managed Service Provider contributions.

RackN Landscape

Collaborative Platforms

Please see the “Building Infrastructure In Layers” brief.

Digital Rebar Provision and control layered architecture is specifically designed to integrate with orchestration and configuration management platforms. There are several classes of integrations that RackN supports for Digital Rebar Provision.

Configuration Management tools like Ansible, Chef, Puppet or SaltStack fit easily into Digital Rebar Provision. For Ansible, Digital Rebar Provision prepares hosts and then provides a complete inventory to feed into the system. For agent-based tools, Digital Rebar Provision can stage nodes, install the agents and then get out of the way. In all cases, Digital Rebar Provision delivers infrastructure in a ready state that these tools expect.

Resource Pooling tools like Terraform or BOSH require Digital Rebar Provision to maintain a pool of ready state nodes to be delivered on request. When contacted, Digital Rebar Provision must deploy the requested image to the system and signal when provisioning is complete. This approach is very cloud-like.

Inventory Management tools expect Digital Rebar Provision to catalog systems and report their state to an external system like Collins. In these cases, Digital Rebar Provision provides comprehensive reporting and discovery while the management system is the “single source of truth.”

Work Management platforms like ServiceNow provide triggers for provisioning actions and get notified when requests are complete. These systems typically expect very high level responses. These systems typically expect very high level responses.
Competitive Products - Private Cloud Automation

Digital Rebar Provision focuses exclusively on physical infrastructure; however, the benefits achieved at this layer displace on-premises platforms that provide similar value using virtualization such as VMware, OpenStack or Nutanix. RackN provides hardware management that is as simple and fast as virtual machine managers without the overhead, complexity and cost of these platforms.

This is especially true for companies moving to more containerized workloads because the value of virtualization is further hidden from users and operators. Even in a heavily virtualized environment, RackN provides value by improving a significant gap in the operational underlay of these platforms. Thus, even companies committed to virtualization will find immediately value from RackN implementations of Digital Rebar Provision.

Understanding Data Center Automation by Role

The following section dives deep into how RackN supports different roles in IT using Digital Rebar Provision and integrations. We suggest focusing on your own viewpoint first and then reading others.

Roles:
1. Operators and System Admins
2. DevOps and SREs
3. CIOs and IT managers
4. Systems Integrators

RackN Benefits for Operators and System Admins

Operators job combines both ongoing maintenance and emergencies with providing support for long term projects. For this reason, they are very sensitive to any tools that add complexity. RackN has focused considerable engineering effort in ensuring that Digital Rebar is simple to understand and flexible enough to handle the range of challenges faced by operators.

Simplicity and Transparency

RackN engineers have deep field experience installing and supporting data center operators; consequently, we work hard to make sure that Digital Rebar generates great logs and does work in small units. Our mantra is to ensure their minimal "magic" even for a fully automatic behavior. We call that composable operations.

That focus on composability means that changes are confined to very small parts of the larger system. It also helps encourage reuse of automation and scripts. The entire design of Digital Rebar Provision revolves around this concept including our read-only templates and content packaging.

CLI and API Driven Scripting

Good data center automation must not require manual or user driven actions. For that reason, everything RackN designs is CLI and API consumable first. We take a lot of pride in making our systems easy to integrate and script because we know that CLIs help operators scale more than UI.

We also understand that good operations software is service oriented. Our REST APIs are designed for secure remote operation(s) and integration(s). Integration is our objective, not an afterthought, so we make sure that our API is expressive as part of larger system instead of serving stand-alone use-cases.

Tolerance for Site-Specific Customization

Every data center has unique attributes that must be accommodated. While part of this heterogeneity is due to operator
choice, most of the variation is due to natural innovation and support(s) multi-vendor supply chains. By assuming variation as the default, RackN has prepared our designs to tolerate real operational needs and be resilient for future innovation.

Our drive for composable automation is a reflection of desire to find ways to share and reuse automation across all data centers. Our design allows users to range between a completely customized experience to a nearly off-the-shelf environment. This approach allows customers to graciously transition from bespoke automation to standard practices at their own pace. It also allows them to start with simple semi-scripted processes and gradually add complexity as their comfort with automation increases.

**RackN Benefits for DevOps and Site Reliability Engineers**

The roots of RackN products go directly to DevOps practices. We know first hand that automation is required for running infrastructure reliably and scaling in a practical way. Sometimes that means that we have to do more work upfront and learn something new; however, we know that the benefits come back quickly as complexity and scale increases.

**Completely Automated Processes**

We designed Digital Rebar Provision to disappear into a large system. As the bottom of the stack automation, RackN is rarely visible to the end user. Our number one job is to make physical operations as seamless and reliable as possible because, frankly, no one wants to be touching servers.

The goal of disappearing is built into everything we do: from APIs to logging. We understand that we create value by making the pain of data center operations go away so that DevOps teams can focus on building value chains, monitoring applications and helping maintain production.

**Simple but Complete Workflows (the CI/CD Data Center)**

The RackN team distinguishes between Orchestration (Digital Rebar v2) and Workflows (Digital Rebar v3) by considering how work is coordinated between machines. In Orchestration, we coordinate activity in two dimensions: on a machine and across machines. This creates complex dependency graphics and state tracking requirements. For Workflow, we only track effort on a single machine across multiple stages and transitions. Typically, Digital Rebar workflow focus on driving a sequence (can be non-linear) of steps to achieve a desired end state.

Since workflows are much simpler to build and maintain, Digital Rebar Provision allows operators to quickly create and maintain powerful automation for their physical infrastructure. In our experience, most of the data center building is performed as the workflow with front-loaded orchestration. For example, Ansible playbooks do both but most orchestration decisions are wired into the inventory and rather than made dynamically. That's why Digital Rebar Provision takes on workflow and expects operators to bring their own orchestration tools like Ansible, Terraform or others.

**Plays Well and Integrates With Other Systems**

The IT industry is a best-of-breed innovative mixing bowl of technologies. This is especially true in the infrastructure space where we have multiple hardware, operating system and infrastructure vendors. Rather than ignore this hybrid environment, RackN attempts to embrace heterogeneous environments by focusing on integration capabilities. This approach helps minimize disruption and allows us to focus.

When it comes to integration, it is important to distinguish between “can” and “should.” We’ve keep many integration points open in Digital Rebar so it’s possible to create complex integrations. Typically, we try to measure good integrations by their simplicity and if they create or reduce technical debt. The RackN team is happy to discuss scenarios and help create sustainable automation.

**RackN Benefits for CIOs & IT Managers**

Most executives want to spend very little time on infrastructure and that’s logical. Managing infrastructure is about keeping the lights on instead of creating new value; however, doing it badly hurts profits, slows delivery and create(s) risk. If we cannot ignore infrastructure then we should make it reliable, consistent and predictable. In a word: make IT boring.

**Consistent and Repeatable Operations**

One of the major problems we see in data center operations is inconsistent process and lack of best practices. It’s not simply that operations teams are not given the time or resources to build: there have been gaps in data center systems that forced teams to create custom scripts and invent processes. The consequence is that most data centers have evolved with bespoke tools and lack standard process(es). This make it difficult to scale infrastructure quickly or reuse industry practices.

RackN is used to these environments. Our solution accommodates a very wide range of infrastructure configurations and provides an incremental path away from custom toward our proven best practices. No massive rework is required to get started but benefits can start as soon as the platform is installed.
Centralized Multi-Site Infrastructure Management

Unnecessary variation adds significant cost and complexity to IT operations. In some cases, like having multiple vendors, variation is useful. RackN has worked hard to create variation where useful and make(s) it simple to enforce consistency everywhere else. Our specialized composable design for Digital Rebar Provision allows teams of distribute read-only automation to all sites and limit(s) the scope of customizations to clearly defined areas.

In addition to our package distribution model, Digital Rebar uses API driven configuration instead of legacy configuration files. That means that privileged access to the system is not required to manage the infrastructure. It also makes it possible to implement centralized control and synchronization without an additional configuration management layer.

Control and Visibility into Every Aspect of Infrastructure

Today’s dynamic data centers demand a high degree of compliance, security and monitoring visibility. Digital Rebar breaks through the operating system “floor” of management systems by exposing the physical infrastructure to both management and inventory. Since every action taken by Digital Rebar is logged and discoverable, IT managers can track providence of gear from first boot to decommissioning, including intermediate rebuilds and reassignment.

Leading data centers are moving towards an immutable model where systems are never “patched” or “reconfigured” instead they are decommissioned, scrubbed and (re)provisioned with the latest updates on a regular basis. With RackN, server resets can be reduced to minutes. That allows for a continuous deployment process where servers are being reset on a weekly (or faster) basis. This approach significant improves security and agility of the infrastructure.

RackN Benefits for Systems Integrators (SIs)

System Integrators face all the challenges of the groups because they typically fulfill these roles for their customers; however, they also have unique needs that span customer relationships.

Accelerated Time to Value

SIs customer engagement models expect them to leverage cross-customer expertise and synergies. RackN creates a highly predictable foundation for IT delivery from the most basic data center building blocks. Digital Rebar Provision accelerates new deployments and can retrofit existing brownfield infrastructure to reduce mistakes, enable self-service and improve control.

Beyond taking provisioning from weeks to hours, elimination of manual processes creates significant ROI for SIs by freeing expensive engineers from routine tasks. Digital Rebar Provision non-disruptively replaces customers’ home-grown and fragile processes with a open, simple, consistent approach that can be implemented in the time it often takes to set-up a server by hand.

Using Repeated Patterns and Best Practices

RackN has implemented best practices using Digital Rebar Provision to ensure that customers immediately benefit from our deep experience in data center automation. The lack of tooling means many customers have evolved custom scripts that are hard to maintain, do not create business value and, yet, are difficult to replace.

SIs implementing RackN replace custom automation with standard templates and processes. Our proven workflows can be upgraded and patched to ensure customers stay current with the latest automation and security. There is no market differentiation for customers at the infrastructure layer so SIs using RackN improve their competitive position by eliminating needless variation.

Cross-Organization Visibility and Reporting

Infrastructure related problems are difficult to find and consequently expensive to correct. RackN integrations on top of Digital Rebar Provision creates visibility for IT at the most fundamental level. SIs can take advantage of workflow events to track progress of initial and ongoing provisioning tasks. In addition, RackN security, discovery and inventory extensions ensure that systems are accurately managed down to the firmware configuration. This enables easy standards conformance and fast compliance reporting.

The RackN multi-site management tools expand Digital Rebar Provision reporting from a single instance to a world-wide pane of glass for your infrastructure. Our PCO SaaS is able to track details from multiple customers’ provisioning installations. This helps SIs manage their data center portfolio in a central unified way that highlights anomalies and trouble spots quickly. These capabilities translate into more resilient infrastructure, more scalable services and a better customer experience.
Incremental Value Add and Upselling

The Digital Rebar Provision scaffolding model encourages adding complexity (or sophistication?) in incremental steps. Customers start with basic services and expand capabilities based on their readiness. While CIOs and SRE want advanced features quickly, we’ve found successful deployments minimize disruptive changes that increases an SIs rate of success without blocking future features.

This approach creates an ongoing, value-based relationship with customers because they can pay for functionality they are using and not get distracted by features they are not ready to consume. For SIs, this provides both a quick win and a long-term roadmap.

Managed Service Opportunities

RackN provides new levels of control for remote and automated data center management at the most foundational level. This creates new opportunities for SIs to support customer environments from a centralized operations center using standard practices. Our tolerance for heterogenous hardware, operating systems and configurations allows SIs to scale while still supporting diverging customer infrastructure requirements.

We are seeking customer facing partners motivated to offer IT transformation and management solutions. This allows RackN to focus on the software aspects of infrastructure management. Our goal is to improve the ROI for running data centers which requires a product focus instead of a services focus. IT is a demanding 24x7 industry and our customer need SIs to provide deep services that match their business needs.

Conclusion

RackN has created a platform that addresses data center infrastructure management at the most fundamental level. By building robust automation at the physical layer, many of the challenges that makes IT expensive, slow and risks are addressed.

Getting started with Digital Rebar Provision only takes 5 minutes and just an hour to learn the basics. It’s time for us to move past slow, complex IT automation and focus on cloud native practices for every layer of our data center stack.

It’s time for data centers to experience a 10x performance gain; sign up for 30-day trial at www.rackn.com/trial.