# Unlock
# Cloud Possibility for
# IBM® Power Workloads

## Skytap®

A Kyndryl Company

# Executive Summary

If your company relies on mission-critical applications that run on AIX, IBM i (AS/400), or Linux on IBM Power Systems in the data center, you may only consider moving these traditional workloads into the cloud when faced with a compelling event. An expensive hardware refresh, data center consolidation, or your current provider exiting the Power business are common examples. But replatforming these monolithic mission-critical applications can require time, manpower, and high levels of risk that keep them locked in the data center.

Now there is a way to move your Power workloads into the cloud in their native format, without rewriting or replatforming. Skytap is a cloud service that natively runs traditional workloads on IBM Power Systems hardware in the public cloud. This e-book will help you understand cloud basics and benefits and how Skytap lets your Power workloads function as they do on-premises while gaining cloud advantages.

Learn how Skytap provides a safe, low-risk path to the cloud that lets you continue to use existing processes and staff, along with the steps most "lift and shift" migrations follow. With the increased operational resilience, scalability, and security offered by the cloud and the minimal-risk migration path offered by Skytap, consider why the smartest move might be to migrate now rather than under the tight deadline of a crisis.
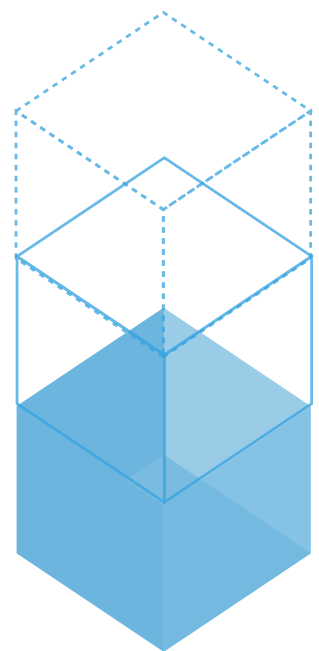
# Cloud meets Power

Your company may already have x86 applications running in the cloud. But if you've been focused on supporting Power Systems, you may not be as familiar with the cloud as your x86 counterparts.

In the case of Skytap, Power Systems hardware is located in hyperscaler data centers backed and maintained by those hyperscalers – and Skytap is a cloud service that allows you to access and work with your Power workloads just as you would on-premises. VMs/LPARs, memory/disk/CPU allocations, file system structures, IP addresses, hostnames, and network subnets are replicated in the cloud to match what's in the data center.

Once your applications are in the cloud, you can take advantage of cloud features and functionality right away, such as:

1. **Operational resilience**
   Cloud environments are ideal to support high availability and disaster recovery (HA/DR). Rather than over-provisioning with duplicate hardware for maximum need, the cloud's pay-as-you-go model allows you to failover with the capacity and compute resources you need in the event of an outage. You only pay for what you use, when you use it.

2. **Scalability and flexibility**
   The cloud is flexible and easily scales based on your usage and business needs. If your team needs maximum resources during a software release, capacity can be spun up as needed, then released when work is complete. Or, if applications are not used during nights and weekends, resources during those periods can be freed up. Capacity can be adjusted to align with business demands.

3. **Security**
   The cloud also offers leading-edge security across physical data centers, infrastructure, and operations that provide greater levels of threat protection than on-premises solutions, and reduces the effort and expense of trying to stay ahead of evolving threats.

4. **Eliminate data center costs**
   Hardware, operating systems, and maintenance contracts add up and require periodic upgrades and renewals, along with ongoing network, power, and other data center costs. Moving to the cloud lets you adopt a more consistent OPEX model that more directly aligns spending with business needs.

5. **Prepare for talent shortages**

   The people with the skill sets required to keep often fragile legacy applications are maturing without the equivalent talent to replace them. By moving applications to the cloud, you can start to gradually replatform into modern architectures that support agile development and DevOps processes.

6. **Improve business agility and innovation**

   Once applications are in the cloud, you can modernize them at your own pace to support digital transformation initiatives and innovation. Incorporate new technologies such as advanced data analytics, machine learning, and AI to better respond to changing customer and business demands.

# Don't wait to migrate

For applications that have performed "as-is" for decades, it may seem like the safest route is to continue with the status quo. The cost and complexity of replatforming may be too daunting, and there may be a desire to retain Power's features and capabilities. But then a precipitating event may force a decision: continue to invest in the data center with a maturing workforce or seriously consider the cloud. For example:

**Hardware refresh**

As Power hardware reaches its end of service life (EOSL), expensive upgrades are required. Maintenance contract renewals may come with unexpected price increases.

**Current provider exiting Power**

Your managed service provider may choose to exit the Power business due to hardware upgrades and contract expenses.

**Expansion needs**

Investing in new hardware and data center resources can be disproportionately expensive concerning business growth.

**Data center consolidation**

As more x86 applications move into the cloud, or as the result of mergers, acquisitions, or divestitures, your company may be consolidating or eliminating data centers.

**Business continuity**

To ensure mission-critical application availability, it can become too costly to invest in duplicate hardware infrastructure or rely on tape backup systems that have unacceptably long recovery windows.

With Skytap, you can migrate your Power-based applications into the cloud as-is, eliminating the expenses associated with owning and supporting your hardware and data centers, and providing the flexibility, scalability, and availability you need. Migrating is easier than you think, so consider making the move before circumstances force you into it under a tight deadline.

# Why choose Skytap?

Skytap lets you gain immediate benefits from the cloud with very little risk while reducing or removing the reliance on on-prem resources. Traditional production and development/test workloads are "lifted and shifted" into Skytap in their native format – no replatforming or rewriting required. With Skytap, you can:

### Minimize risk
Complete environments, including VMs/LPARs, network configurations, and business applications are migrated exactly as they are on-prem, without rewriting or replatforming. You get a safe path to the cloud with minimal re-engineering risk.

### Maximize existing talent
Existing IT, development, and test staff continue to use the same processes and tools they always have. No need to retrain or hire new talent. Allow teams to learn cloud concepts and explore cloud-native services.

### Increase staff efficiency
Developers and testers can quickly and easily self-provision clone environments, eliminating the wait time for resources and removing the risk of configuration drift common with physical systems. IT retains oversight and control.

### Align spending with usage
The cloud's elastic scaling means you only pay for the capacity you actually use. Instead of expensive CAPEX investments for maximum need, Skytap's pay-as-you-go OPEX model aligns the cost of resources directly with application and business needs.

### Implement cost-effective disaster recovery
Rather than investing in duplicate systems in an offsite data center for backup and DR, Skytap allows replica environments to be scaled up immediately during an outage and released when normal operations resume. You can meet aggressive recovery objectives and only pay for capacity used during the outage.

# How does Skytap work?

Performing an initial lift and shift of existing workloads in their native configuration into Skytap is the most risk-free way to migrate traditional workloads. An exact representation of the existing system is made in the cloud, without re-engineering any components into cloud-native equivalents.

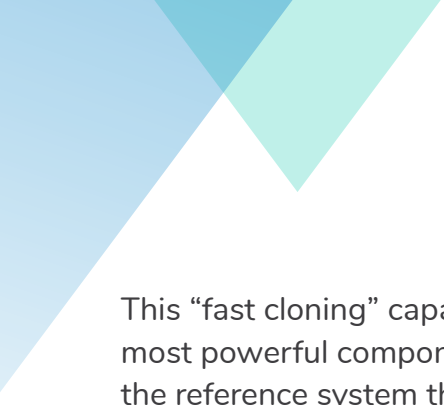**Figure 1:** Migrate applications "as is" from on-prem to Skytap
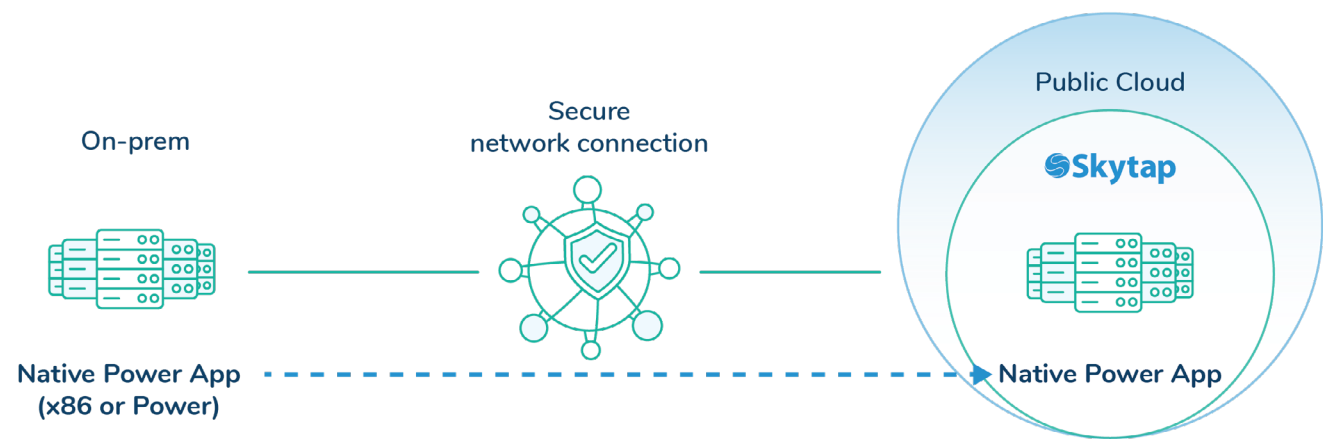


## Skytap environments

Skytap environments replicate on-premises data center environments, including infrastructure, storage, networking, OS, middleware, memory state, and applications in the cloud. The same number of VMs/LPARs, memory/disk/CPU allocations, file system structures, IP addresses, hostnames, and network subnets are created in the cloud, representing a clone of the system of record that exists on-prem.

Each Skytap environment is a software-defined data center (SDDC), which is saved as a read-only template that can be shared and used to clone additional production-quality environments in a matter of minutes. Users can work with a clone environment that represents the current production environment, eliminating configuration drift. Multiple environment clones can be running simultaneously without colliding.

**Figure 2:** On-prem to cloud workflow: applications become templates that can be cloned
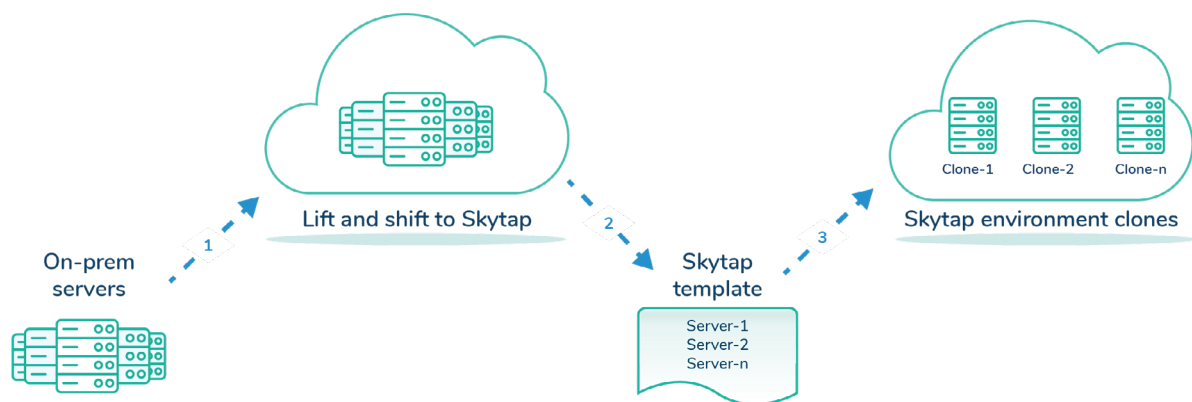
This "fast cloning" capability of creating ready-to-use environments from a template is the most powerful component of the cloud-based approach. It provides multiple exact copies of the reference system that can be shared with various engineering and dev/test groups, all of which can be running in parallel. There is no need to change the IP address of individual servers or their hostnames.

If environments need to communicate to other on-prem resources, they are differentiated via an isolated NAT mechanism, as described below. Many of the environments contain the same VM clone base image(s) with the same hostnames, IP addresses, and so forth.

## Creating cloned environments with duplicate address spaces

There are many benefits associated with creating multiple working environments that replicate the same network topology as the final target system. In this context, "replicate" means re-using the same hostnames, IP addresses, and subnets within each environment.

To achieve this, some form of isolation must be implemented to avoid collision across duplicate environments. Within Skytap, each environment exists within its own software-defined networking space not visible to other environments that are also running. Using this mechanism, it is possible to create exact clones of multi-VM architectures with multiple subnets containing replicated address spaces. Each environment becomes a software-defined data center.

Cloned environments communicate back to upstream on-prem resources via a single focal point called an "environment virtual router" (EVR). The EVR hides the lower VMs containing duplicate hostnames and IP addresses and exposes a unique IP address to the greater on-prem network. Using this mechanism creates a simplified and elegant way for multiple duplicate environments to exist in harmony without breaking basic network constructs.

By allowing duplicate hostnames and IP addresses to exist, individual hosts do not have to go through a "re-IP" process, which is error-prone and time-consuming. The EVR paired with a "jump-host" can be configured to forward SSH requests (via SSH proxy, OpenSSH 7.x and higher), which allows SSH into each unique host in an environment. From on-prem, users would SSH to any host in the environment (e.g. ssh user@environment-1-host-2), which exposes a unique IP address to on-prem, and then relays down to the VM within an individual environment.

**Figure 3:** Multiple environments with duplicated RFC 1918 IP addresses with no collision
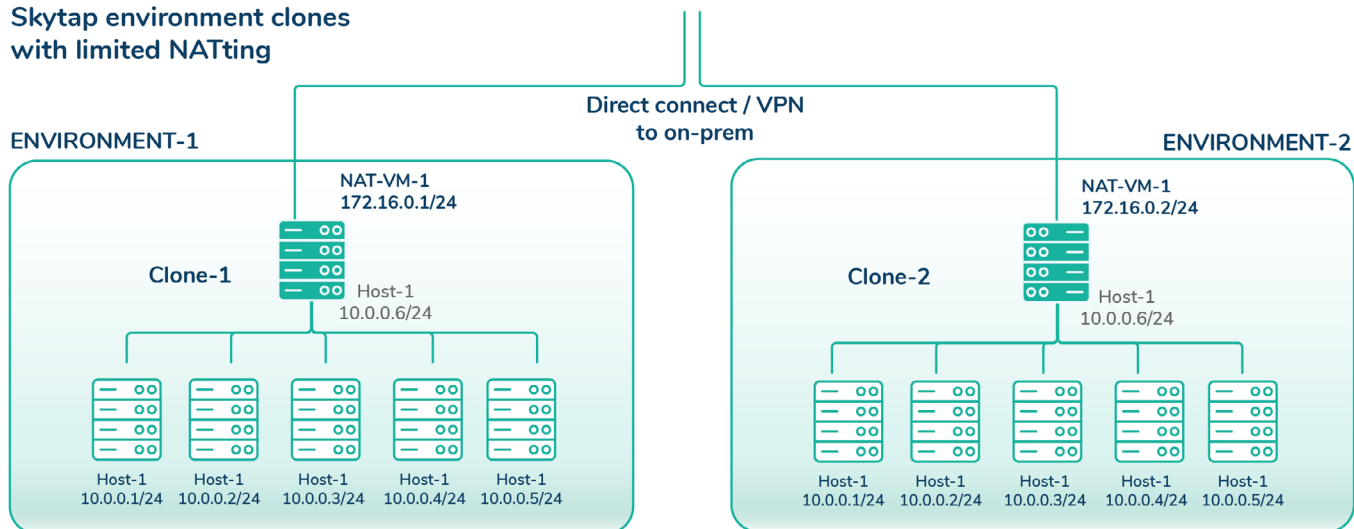


Software-defined networking and API automation can be applied to the migrated application running in the cloud. Power workloads run alongside x86 VMs, allowing organizations to recreate complex on-premises systems already in use, and take advantage of existing cloud subscriptions and services.

# Working with Skytap

Once environments are configured in Skytap, administrators can:

» View and manage networks, which are replicated during import. Software-defined networks replicate on-premises topologies down to layers 2 and 3. Configurations can include VPN connections to external clouds or data centers.

» Save templates to share with groups that need them.

» Enable self-service access to templates so users can deploy a new, running environment with a single click.

» Create a template library of personal, company, or Skytap public templates.

» Manage access and usage quotas by users, groups, or departments.

» Track usage by resource, region, department, groups, or users.

» Manage user roles, alerts, usage quotas, and automatic shut down or suspend/resume.

» Control and automate management functions with REST APIs.

**Figure 4:** Working with Skytap environments



Once templates are created, they are assigned in the Skytap portal to a project. Projects are then assigned to groups of users. Users can only see or access environments that have been assigned to them via the project mechanism. A QA user cannot see an environment solely assigned to engineering, for example. Skytap provides a built-in access/security model so users only see components assigned to them via the project mechanism. Users also have role assignments that allow them to view/edit/admin VMs/LPARs defined in an environment assigned to a project. The Skytap portal provides a complete and audited access control mechanism.

Teams can use popular development, automation, and other tools such as IBM UrbanCode, Docker, Ansible, and Terraform or integrate with existing development, test, and DevOps tools via REST-based APIs.

# "Lift and shift" with Skytap:
## Steps to migration

Once you've decided to migrate, proper planning is the key to success. Most migrations follow similar steps:

### Step 1: Do your planning

**Set goals.** Begin with establishing a use case and project goal. Gather a team with representatives from all affected stakeholders to ensure an understanding of business and technical needs. This is often a good time to bring in a trusted partner with experience migrating traditional applications into Skytap.

**Assess existing workloads.** Once the project has been adequately scoped, the team will need to perform an assessment of existing Power workloads to determine what type of cloud infrastructure will be required. Some areas to consider are:

» Type and amount of on-demand capacity you'll need: always-on, bursting, or variable.

» Cloud and workload requirements such as data center regions, scalability, network, hardware, OS configurations, and external dependencies such as private network connections to on-prem resources.

» How on-prem workloads translate into Skytap capacity, including CPU, memory, and storage requirements for each LPAR. There is normally a notable reduction in concurrently running LPARs in Skytap compared to on-prem, eliminating idle resources and over-provisioning.

**Ensure license compliance.** License compliance is critical to governing your cloud costs. Skytap includes AIX and IBM i OS and LPP licenses in two pricing models: hourly and monthly. Optional PowerHA Enterprise Edition and Rational tools add-on licensing packages are also available. Skytap provides support for Oracle licensing by allocating dedicated resources for Oracle workloads. This includes LPARs as well as dedicated server hosts in single-tenant regions based on customer needs for applications running in Skytap. For more information on licensing Oracle in Skytap, read this white paper.

**Plan for data migration.** The method of data migration will vary depending on an organization's specific needs, including the size of workloads and databases and tolerance for downtime. Skytap offers solutions to fit the data volumes that need to be moved, including transfer via secure FTP, database replication, and encrypted physical hard drives.

### Step 2: Configure Skytap environments

Set up Skytap in preparation for importing VMs, vApps, or LPARs. Skytap mirrors an application's complete, on-premises configuration, allowing it to be migrated without change. Each Skytap environment includes everything the application needs, from VMs to network and development resources. Environments are saved as templates that can be copied as often as needed in just minutes.

### Step 3: Migrate non-production workloads

Move non-production workloads such as dev/test into Skytap to validate the migration plan. Make any necessary adjustments to the process and repeat the migration. Perform unit and systems tests to validate performance and ensure that the migration can be completed in the desired time frame.

### Step 4: Migrate production workloads

On the planned cutover date, import production workloads into Skytap and perform verification tests. Begin using the application from the cloud. Users continue to use the application as they always have and dev/test teams can now quickly stand up and tear down Skytap environments as often as they need to without impacting production.

# Modernize at your own pace

Once your Power applications are in Skytap, you can extend their lives using Skytap environments to improve agility and establish a path to replatforming and modernization. Teams can modernize at their own pace following a phased approach. Skytap's environments-first infrastructure facilitates modern development processes such as agile and DevOps, enabling more rapid modernization of application architectures and services.

## The right time to move is now

Rather than waiting for a compelling event to force your move to the cloud, migrate your Power workloads into Skytap now and start taking advantage of the benefits the cloud has to offer. Migrating with Skytap lets you keep your legacy applications just as they are so your existing staff can continue to work as they always have with minimal risk. You immediately gain resilience, flexibility, and security, and establish a foundation for gradual modernization.

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## About Skytap

Skytap is a cloud service purpose-built to run specialized workloads in Microsoft Azure and IBM Cloud. As the best cloud service to support AIX, IBM i, and Linux on IBM Power together with x86, Skytap makes it easy to evolve traditional workloads by rapidly migrating them to the cloud. Enterprises around the world use Skytap for production workloads, disaster recovery, virtual training labs, and application development. Skytap's cloud environment simplifies management, reduces IT costs, speeds up application development, and allows organizations of all sizes to modernize at the pace of their business. Skytap is a Kyndryl company. To learn more or schedule a demo, visit www.skytap.com

| Skytap Headquarters | Skytap Canada | Skytap EMEA |
|---|---|---|
| 255 S King St, Suite 800 | 1 University Ave, Suite 3139 | 30 Stamford Street |
| Seattle, WA 98104 | Toronto, ON M5J 2P1 | London SE1 9LQ |
| 206-866-1162 | 888-759-8278 | 888-759-8278 |

twitter.com/Skytap

linkedin.com/company/skytap/