

OpenShift Bare Metal Installation Workshop

**Enterprise-Grade Kubernetes on Bare Metal –
Real-World Deployment Experience**

Your Global Partner in Digital Transformation



Global IT Solutions

A leading IT solutions and training company serving a global clientele across India, UAE, USA, Canada, Nepal, and Sri Lanka.



Deep Expertise

Specialized knowledge in Red Hat technologies, DevOps, OpenShift, AI, Cloud, and Automation.



Industry-Driven Training

Our programs are built on real production use cases to ensure practical, applicable skills.



Comprehensive Service

We bridge the gap between enterprise architecture, technology, and the people who drive it.

The Strategic Advantages of OpenShift on Bare Metal



Maximum Performance

No hypervisor overhead for resource-intensive workloads.



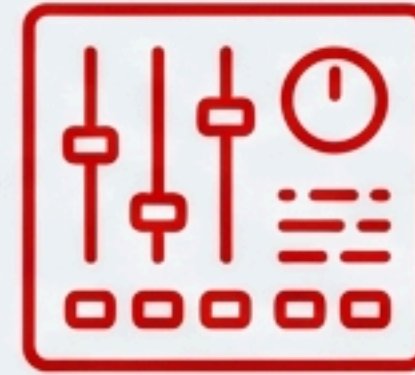
Data Residency & Compliance

Keep sensitive data on-premises, essential for BFSI & Government.



Predictable Latency & Stability

Consistent performance without the 'noisy neighbor' effect.



Full Infrastructure Control

Complete command over hardware, networking, and storage stacks.



Cost Optimization

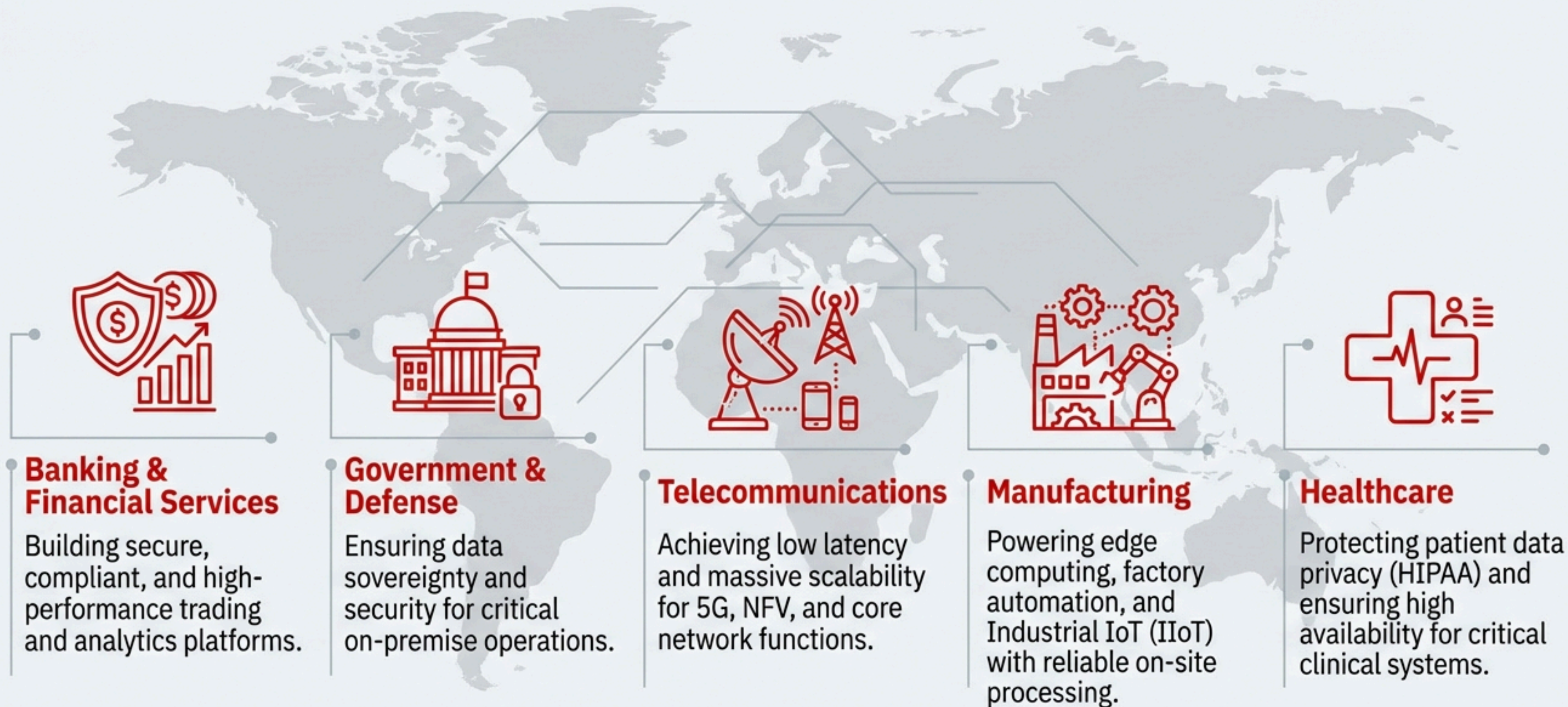
Eliminate cloud compute costs and hypervisor licensing fees.



Enterprise-Grade Kubernetes

The power and security of OpenShift directly on your hardware.

How Key Industries Leverage Bare Metal OpenShift



Proven Success: Transforming a Banking Client's Infrastructure

The Challenge

- Aging, legacy infrastructure hindering innovation.
- Strict regulatory compliance and security mandates.
- Application performance bottlenecks impacting services.

The CubenSquare Solution

- Designed and deployed an OpenShift on Bare Metal cluster using the UPI (User-Provisioned Infrastructure) method.
- Implemented a high-availability (HA) architecture with HAProxy for resilience.
- Configured secure networking policies and role-based access control (RBAC).

The Outcome

40%

performance improvement in application response times.

Zero

downtime deployments for critical updates.

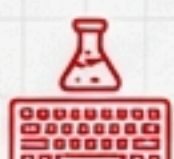
100%

compliance-ready infrastructure established.

Faster

application release cycles, improving business agility.

The Complete Program: OpenShift Bare Metal Installation Mastery

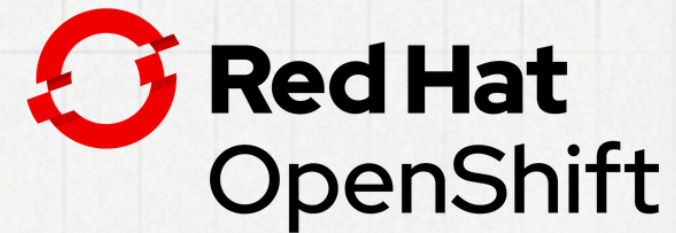
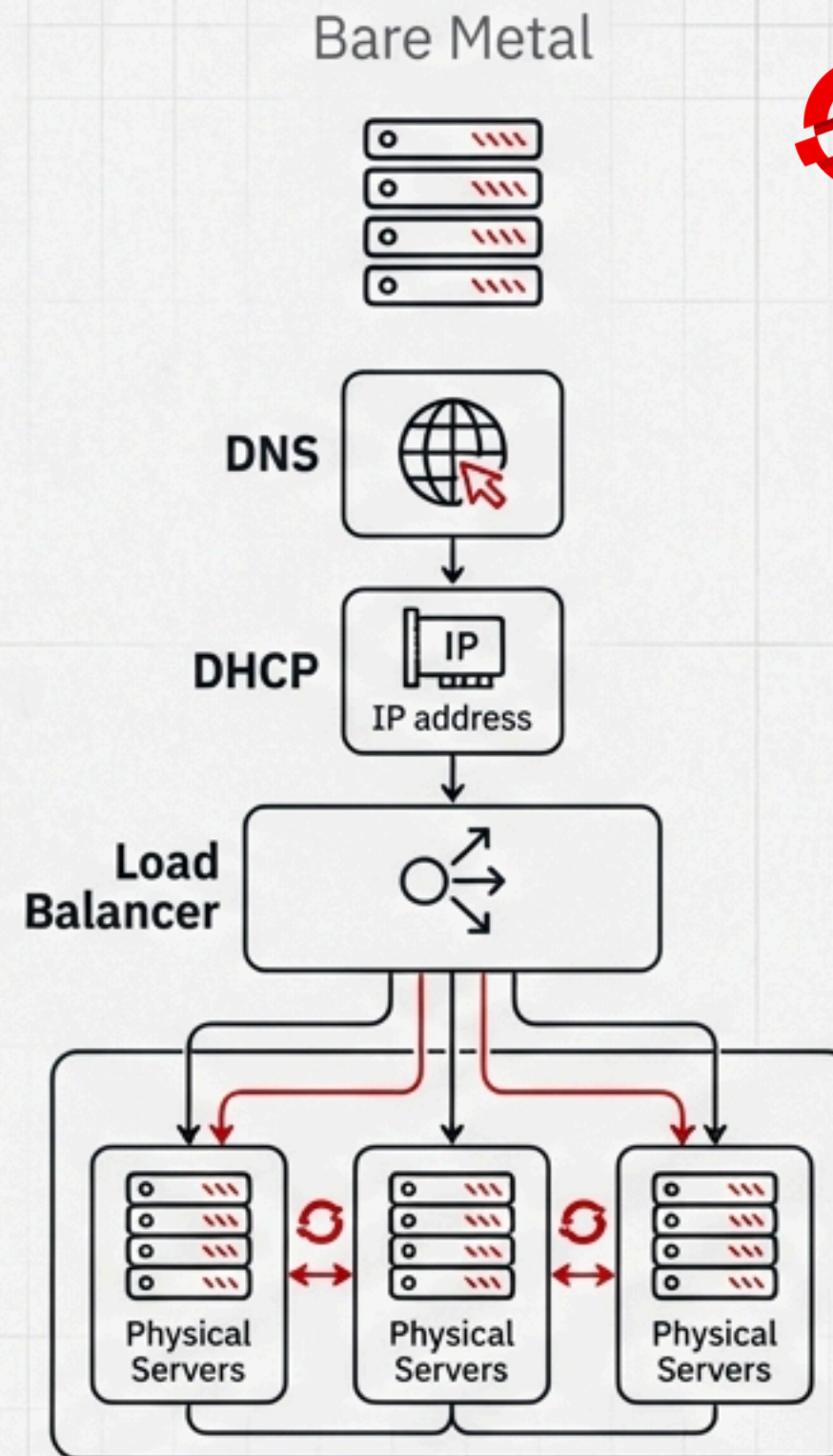
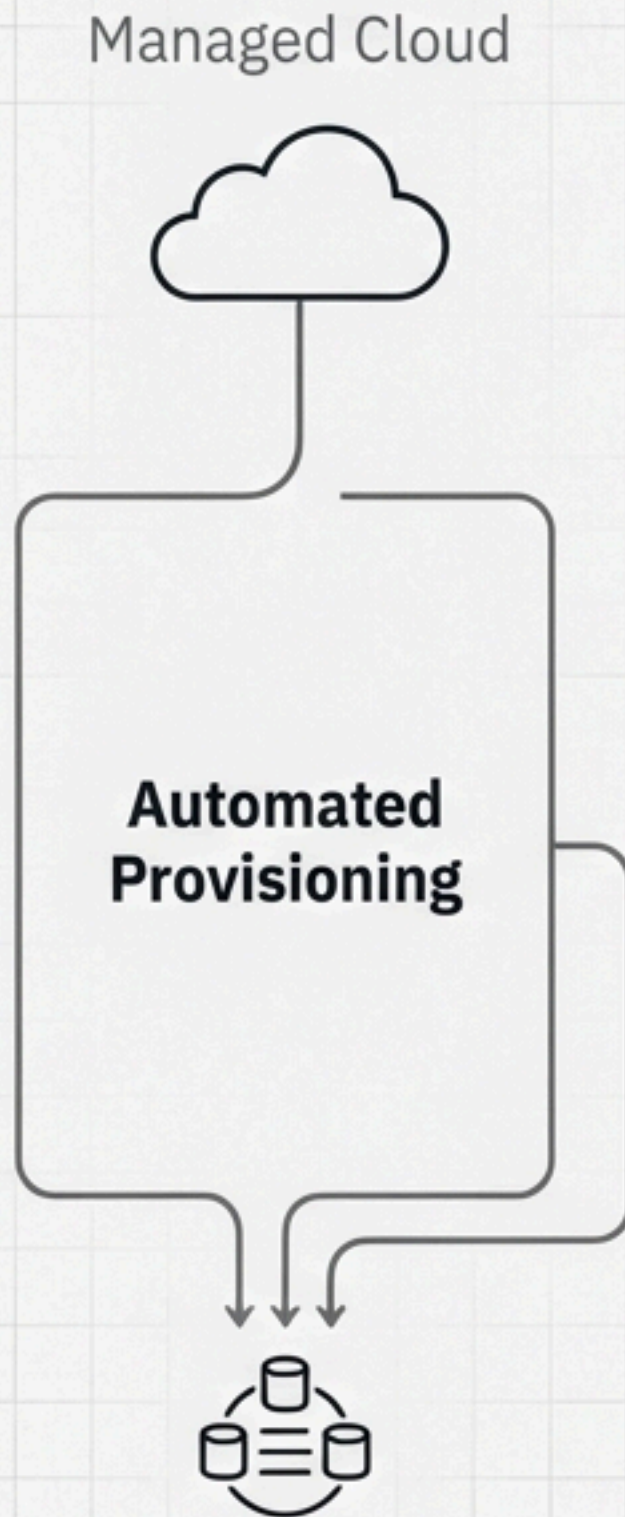
- | | | | |
|---|---|---|--|
|  | Module 1: Installation Methods (UPI vs. IPI) |  | Module 6: Cluster Bring-Up |
|  | Module 2: Foundations & Architecture |  | Module 7: Post-Installation Tasks |
|  | Module 3: Environment Preparation |  | Module 8: Troubleshooting & Best Practices |
|  | Module 4: Core Infrastructure Services |  | Module 9: OpenShift Console & Core Concepts |
|  | Module 5: OpenShift Installation Configuration |  | Module 10: Hands-On Labs (7 total) |



Red Hat
OpenShift

From bare hardware to a fully operational, production-ready OpenShift cluster—this program provides the comprehensive knowledge and hands-on experience to make you the expert.

The Bare Metal Challenge: Flexibility vs. Complexity



Your Responsibility

Deploying OpenShift on your own hardware offers **unparalleled control**, performance, and cost-efficiency. But this power comes with **significant complexity**.

Unlike managed cloud environments, bare metal requires you to **build and control every component** of the underlying infrastructure—from networking to load balancing.

This program transforms that complexity into a **clear, repeatable process**, equipping you with the skills to build and manage robust, production-grade clusters with confidence.

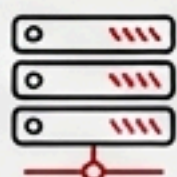
Your First Strategic Decision: UPI vs. IPI

UPI (User-Provisioned Infrastructure)

Maximum Control, Total Flexibility.



You manually configure all infrastructure: DNS, DHCP, HAProxy, web server.



Ideal for custom environments, air-gapped networks, and integrating with existing infrastructure.



Provides a deep understanding of the entire OpenShift stack.

Use Case: When you need to fit OpenShift into a pre-existing, highly-customized data center environment.

IPI (Installer-Provisioned Infrastructure)

Automated & Opinionated.



The OpenShift installer provisions and manages the underlying infrastructure.



Faster deployment on supported platforms.



Less manual configuration required.

Use Case: When you have compatible hardware and want the fastest path to a standard cluster.

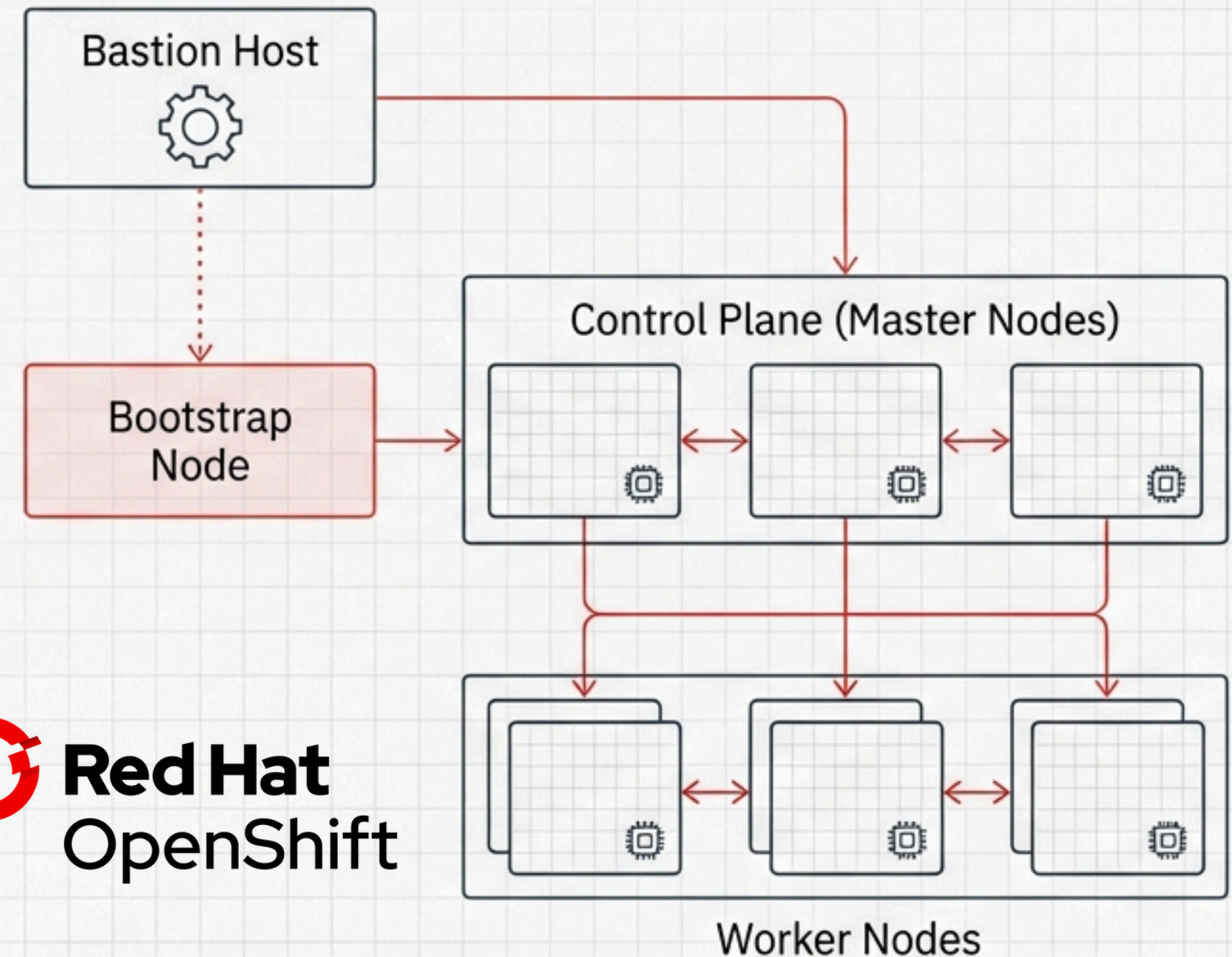
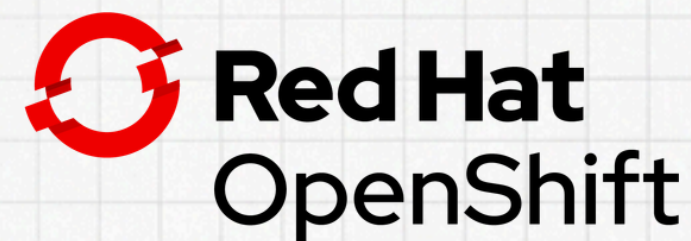
This program focuses on mastering the UPI method, giving you the foundational knowledge to handle any bare metal scenario.

Phase 1: Drawing the Blueprint

Mastering the Core Architecture & Foundations (Modules 1-2)

Key Concepts Covered

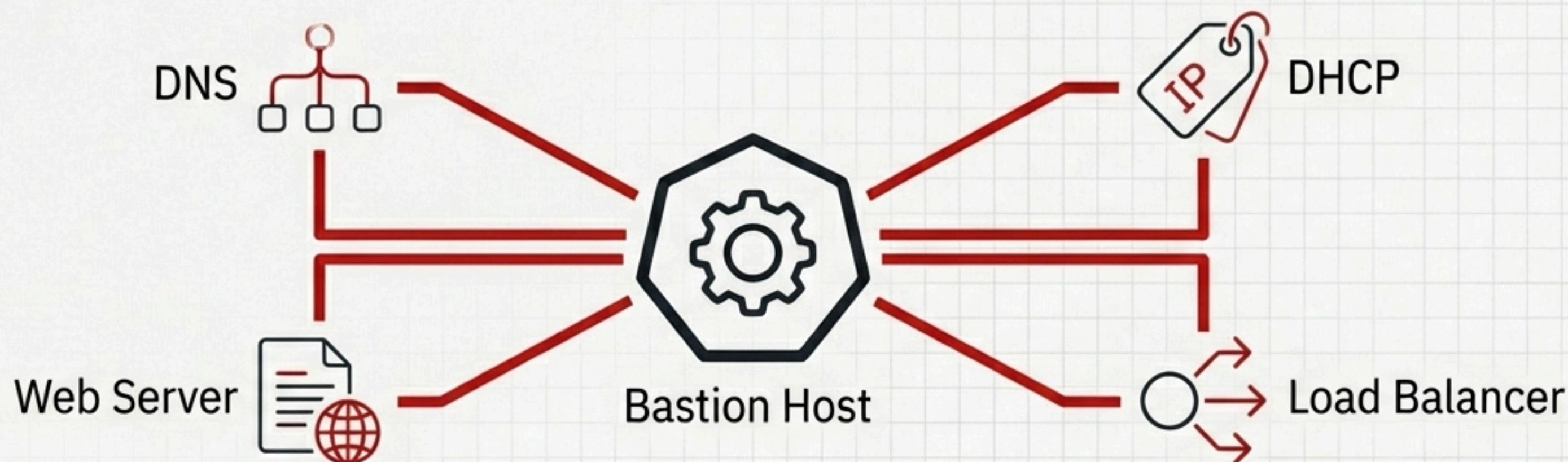
- **OpenShift Architecture:** Understanding the roles of Control Plane (masters), Worker Nodes, and the critical Bootstrap Node.
- **The Bastion Host:** Its central role in installation and management.
- **Networking Fundamentals:** Designing for internal and external traffic with bridged networks.
- **Bare Metal vs. Cloud:** Key architectural differences and why they matter.



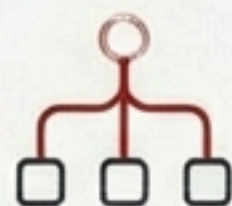
Phase 2: Erecting the Scaffolding

Building the Core Infrastructure Services (Modules 3-4)

A successful OpenShift cluster depends on four critical, interconnected services. In this phase, you will build and configure this essential infrastructure from scratch on your Bastion host.



The Four Pillars of Bare Metal Installation



DNS (bind)

Cluster Name Resolution

Configure forward/reverse zones; create records for API, apps, masters, workers, and bootstrap.



DHCP (dhcpcd)

Node IP Management

Set up static reservations tied to MAC addresses; integrate with PXE boot.



Load Balancer (HAProxy)

High Availability & Traffic Routing

Load balance API (6443) and Ingress (80/443) traffic; configure frontend/backend sections.



Web Server (httpd)

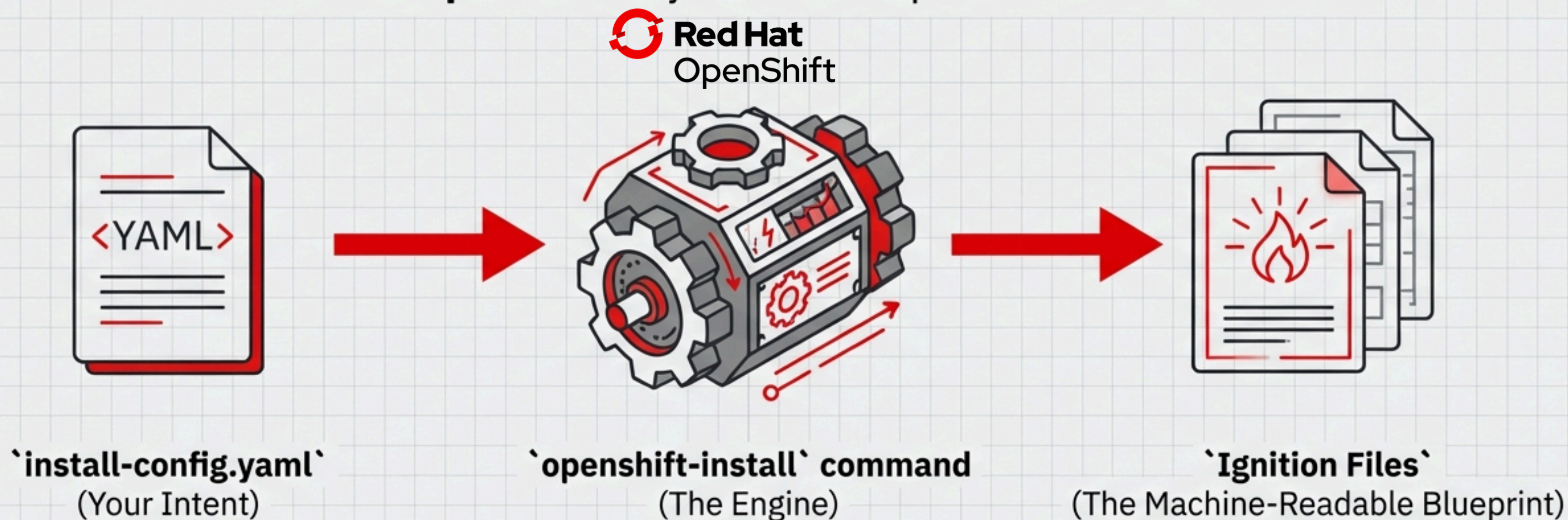
Asset Hosting

Host Red Hat CoreOS (RHCOS) images and the critical Ignition configuration files.

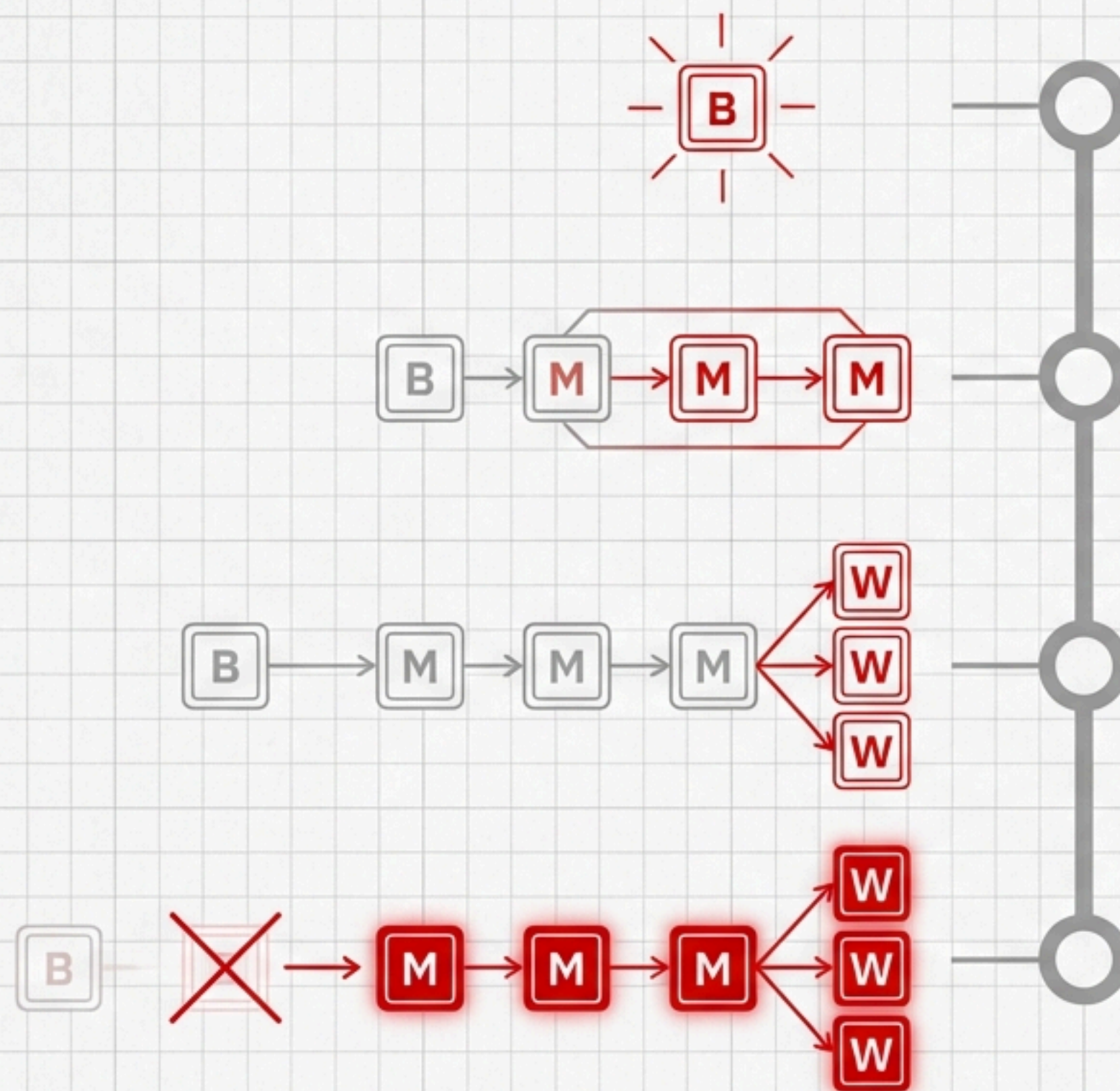
Phase 3: Igniting the Cluster

Configuration, Manifests, and the Cluster Bring-Up (Modules 5-6)

This is where planning meets execution. You will translate your architectural decisions into a set of configuration files that will **bootstrap** and build your entire OpenShift cluster.



The Bring-Up Sequence: From Bootstrap to a Living Cluster



Bootstrap Ignition:: The first node boots using its Ignition file, creating a temporary control plane.
Key Skill: Monitoring bootstrap logs for progress and health.

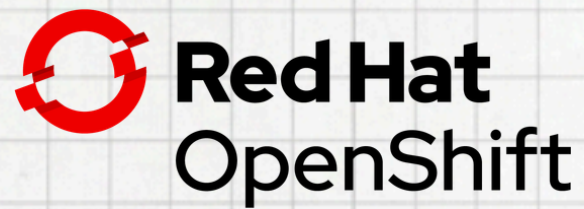
Master Nodes Join: The master nodes boot, discover the bootstrap node, and form the permanent control plane.

Worker Nodes Join: Worker nodes boot and are added to the cluster, ready to run workloads.

Pivot & Validation: The control plane pivots from the bootstrap node to the masters. The bootstrap node is removed.
Key Skill: Validating cluster health and all operators using the `oc` CLI.

Phase 4: Achieving Operational Mastery

Day-2 Operations, Troubleshooting, and Advanced Concepts (Modules 7-9)



An operational cluster is just the beginning. True **mastery** lies in managing, securing, and scaling it effectively. **This phase** equips you with the skills of a seasoned OpenShift administrator.



The Operator's Toolkit: Manage, Monitor, and Secure

Core Management



Authentication: Configure httpasswd, LDAP, or OAuth.



RBAC: Master Roles, Role Bindings, and Cluster Roles for granular permissions.

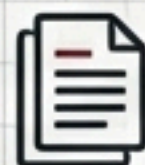


Operators: Use OperatorHub to manage the lifecycle of complex applications.

Observability



Monitoring: Use built-in Prometheus and Grafana dashboards to track cluster health.



Logging: Understand the EFK (Elasticsearch, Fluentd, Kibana) stack.

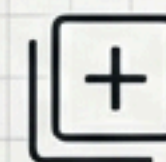
Troubleshooting & Best Practices



Debugging: Use `journalctl` and `oc adm` to diagnose issues with infrastructure or cluster components.



Hardening: Apply security best practices for bare metal environments.



Scaling: Understand considerations for adding more nodes.

The Proving Ground: Hands-On Labs

Move from theory to practice with a full, end-to-end installation and management experience.

Lab 1: Configure Bastion with DNS, DHCP, HAProxy, Apache

Lab 2: Generate `install-config` and Ignition files

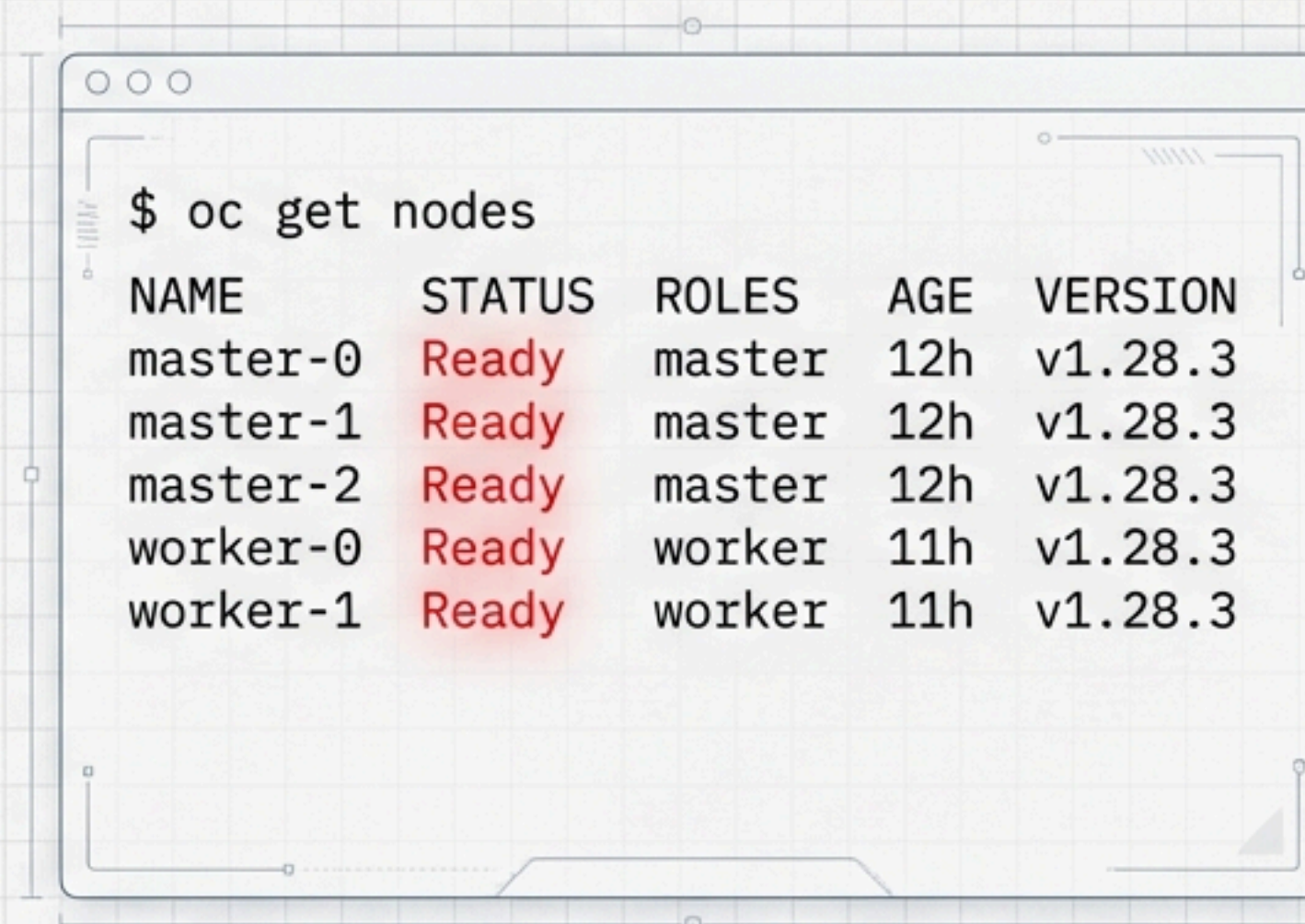
Lab 3: Bootstrap and Master Node Installation

Lab 4: Worker Node Integration

Lab 5: Deploy and Expose a Sample Application

Lab 6: Console Navigation and RBAC Setup

Lab 7: Troubleshoot a Failed Bootstrap Scenario

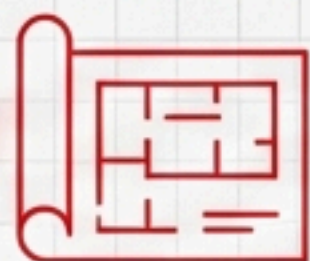


```
$ oc get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
master-0	Ready	master	12h	v1.28.3
master-1	Ready	master	12h	v1.28.3
master-2	Ready	master	12h	v1.28.3
worker-0	Ready	worker	11h	v1.28.3
worker-1	Ready	worker	11h	v1.28.3

Your Path to Bare Metal Mastery

The Blueprint



You will be able to architect an OpenShift deployment tailored to your specific hardware and networking environment.

The Scaffolding

You will be able to build the essential, production-grade infrastructure services required for a UPI installation.



You will be able to build the essential, production-grade infrastructure services required for a UPI installation.

The Ignition



You will be able to generate cluster configurations and manage the entire bring-up process from a single command to a fully operational cluster.

The Mastery



You will be able to manage, monitor, and troubleshoot your cluster, applying operational best practices for security and stability.

Program Details, Deliverables, and Long-Term Support



Duration & Format

- Total Length: **1 Month**
- Format: Live, instructor-led sessions.
- Focus: Intensely hands-on workshop with a real bare metal demonstration.

What's Included

- Dedicated lab access for each participant.
- Complete workshop presentation materials and notes.
- Sample applications for deployment practice.
- Certificate of Completion.

CubenSquare Support

- Training delivered by expert, certified instructors.
- Post-workshop guidance for real-world implementation.
- Personalized career and certification roadmap advice.
- Access to enterprise-level mentoring.



Let's Transform Your Challenges into Opportunities.

Partner with CubenSquare for cutting-edge IT expertise and future-ready solutions.



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