Hewlett Packard
Enterprise

Harnessing Configuration Management & CI Pipelines

From Weeks to Hours

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Agenda

Level-set: The importance of change tracking and automation

Automating changes in CSM

Automating changes in HPCM

Automating changes in OpenCHAMI

Best practices for managing multiple environments

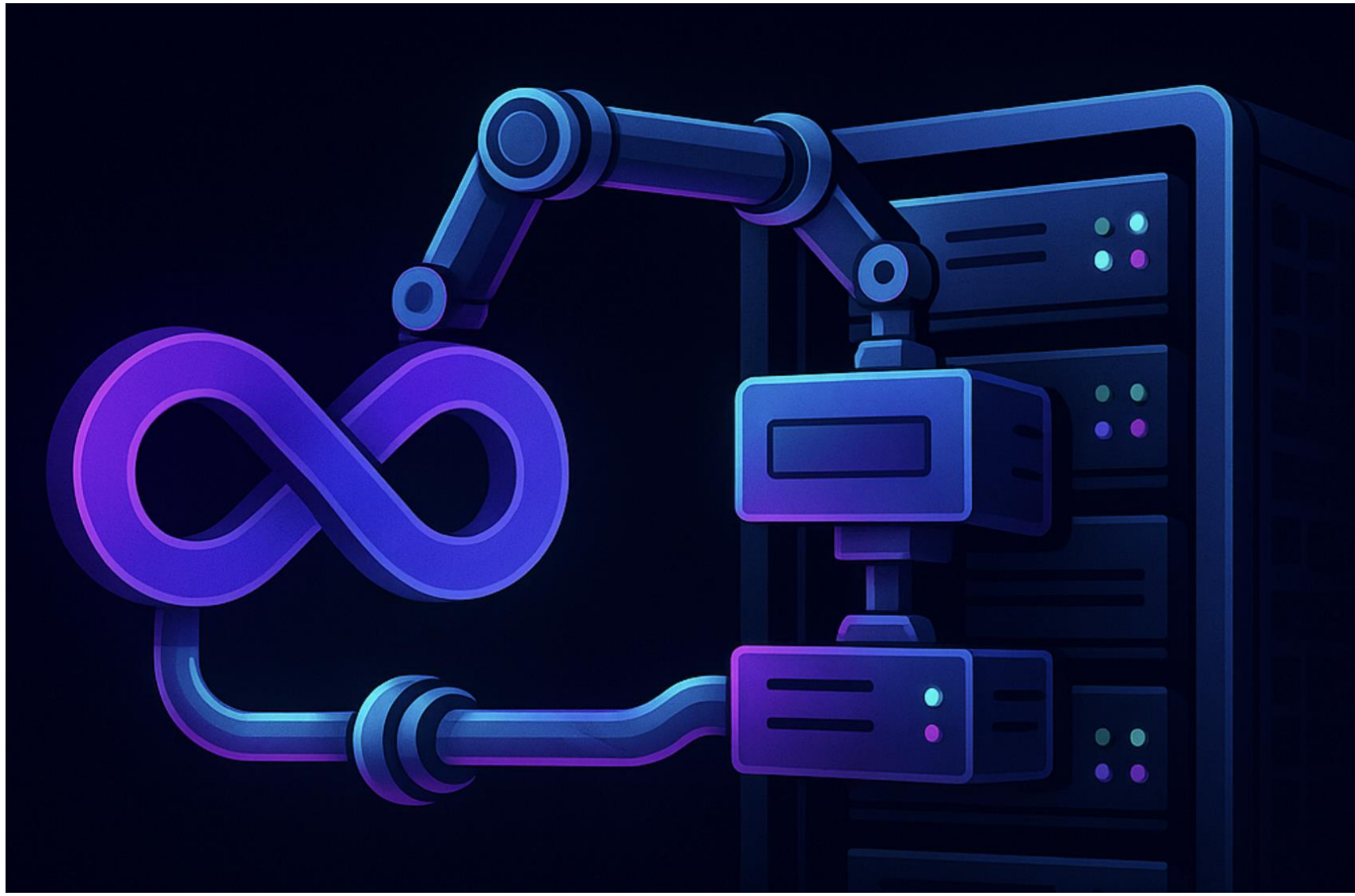
Recap / QA

Version-Control Everything

- Encapsulate everything in source code
- Eliminate bespoke artisanship
- Changes should be tracked and replayed
  - E.g. Switches, state, secrets, configuration, packages, any change

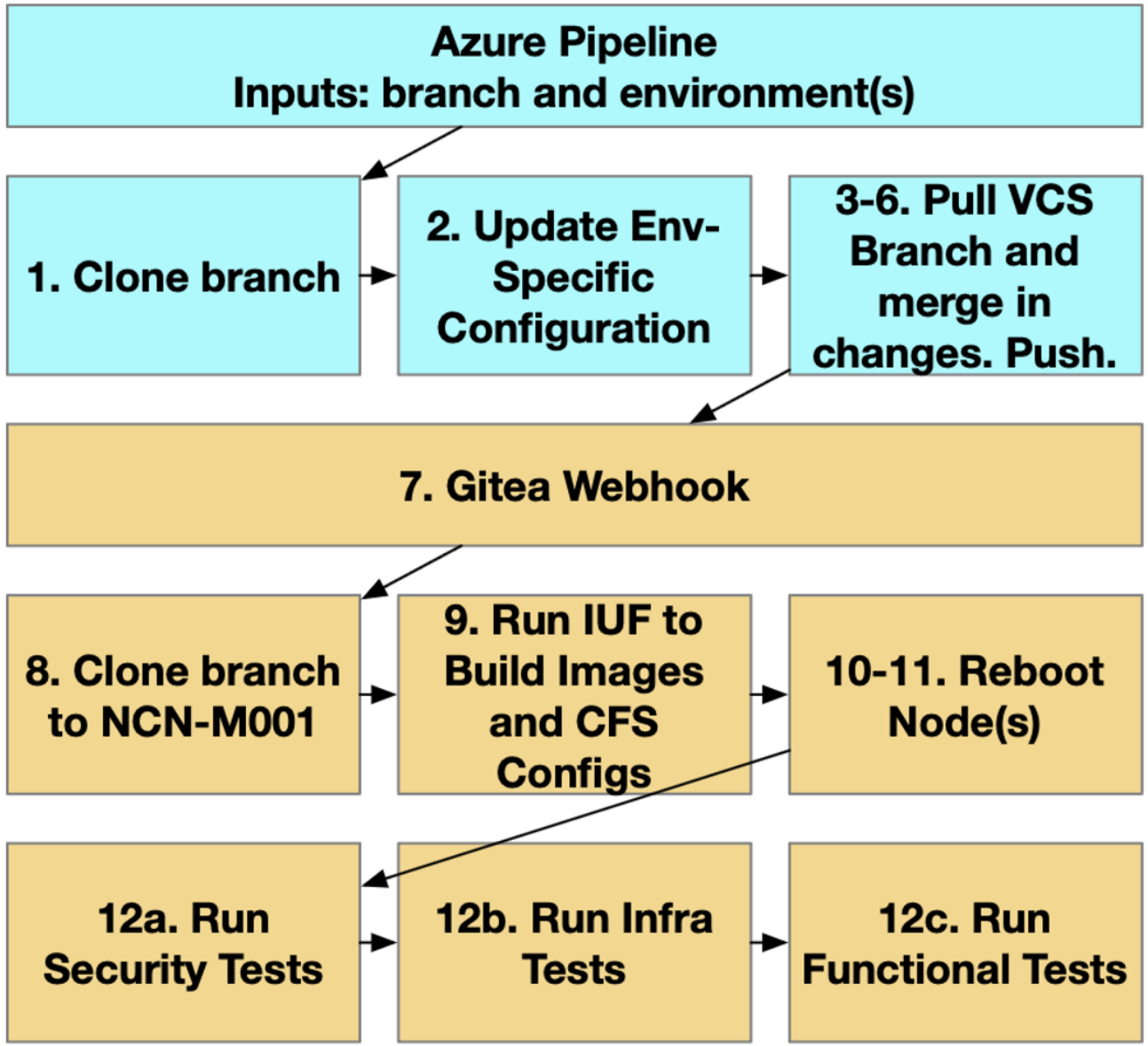
Continuous Integration of Infrastructure

- Deploy across environments consistently
- Automated validation; test units, infrastructure, &functionality
- Idempotency; check, apply, check again
- Enable configuration drift monitoring



Orchestrating CSM Changes

- Source code via VCS (Gitea)
- Artifact warehousing Nexus
- Object storage via S3 (Ceph)
- Configuration management via CFS/Ansible
- Secrets management via Vault
- Pipelines via Argo
- Deployments via IUF



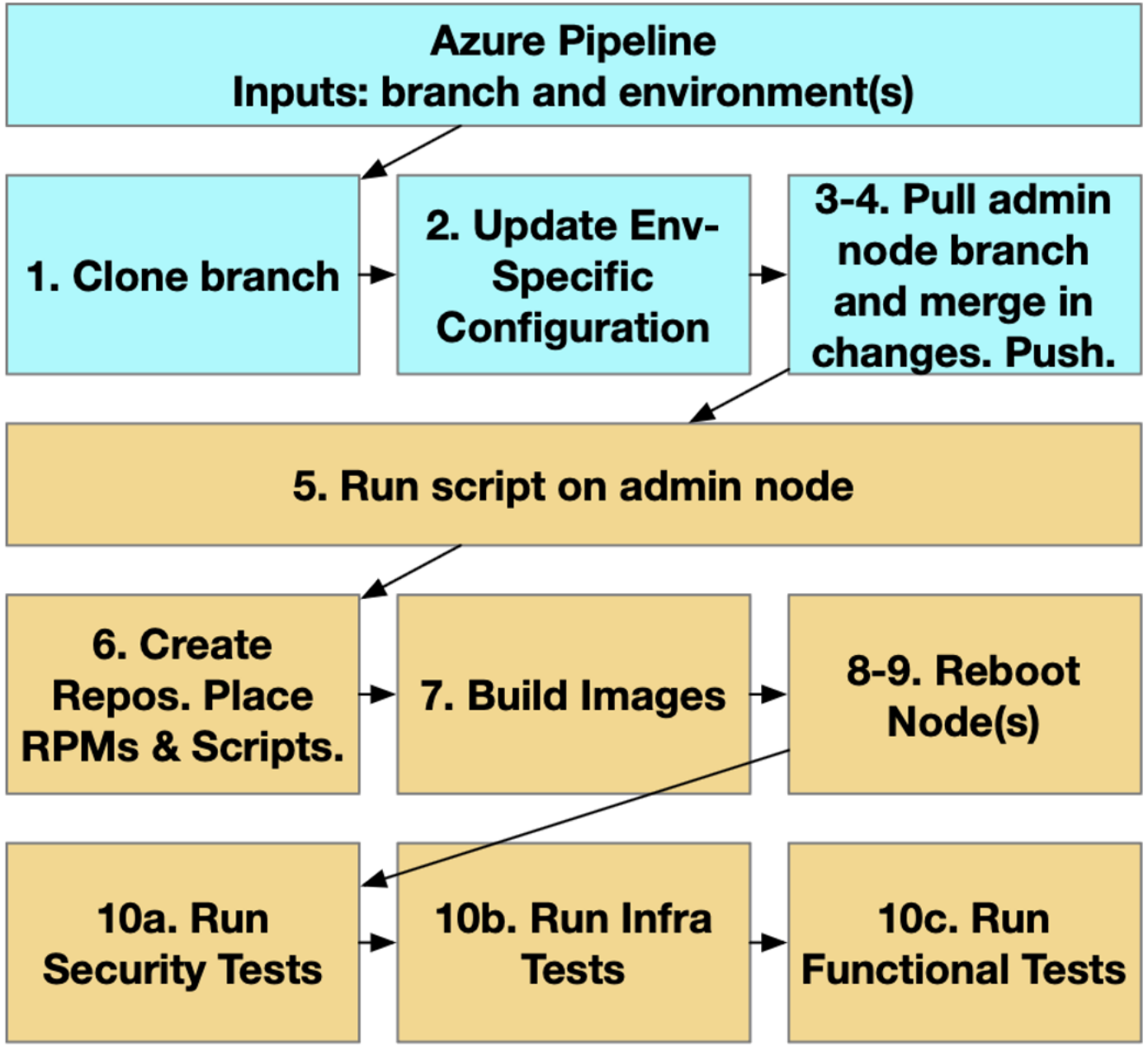
CSM Compute Change Velocity Improvement

Update an image, deploy and test functionality

	Manual		Automation	
Task	Execution Time	Cumulative Time	Execution Time	Cumulative Time
Stage Ansible in VCS	30	30	5	5
Deploy Artifacts in Nexus	30	60	1	6
Create CFS Configurations	30	90	2	8
Build Images	60	150	45	53
Create BOS session template	15	165	1	54
Reboot nodes with new config	30	195	20	74
Validate changes	15	210	3	77

Orchestrating HPCM Changes

- Git in flat files over SSH
- File-based RPM repository management
- Image storage is the local file system, use directory namespacing
- Secret credentials stored in encrypted, flat files on the admin node
- CLI tooling is well documented. Some functionality has an API.
- Changes to the management deploy to hotspare, promote, then repeat



HPCM App Node Change Velocity Improvement

	Manual		Automation	
Task	Execution Time	Cumulative Time	Execution Time	Cumulative Time
Push Ansible to HPCM admin node	15	15	1	1
Copy artifacts to HPCM admin node	15	30	5	5
Prepare run-time configurations	30	60	1	1
Build new images	90	150	45	52
Sequentially reboot the HA hotspares for PBS and HPCM into the new configuration	45	195	20	72
Promote new hotspares to primary VIP and run healthchecks	30	225	1	73
Sequentially reboot second nodes for PBS and HPCM	45	255	20	93
Validate changes	15	270	5	98

Orchestrating OpenCHAMI Changes

Iterations in as little as 5 Minutes

- Simplified build schema
- Converts containers to Squashfs
  - Skips layers with no change
- Testable in VMs
  - Skips POST
- Configures via Cloud-init
  - Earlier execution

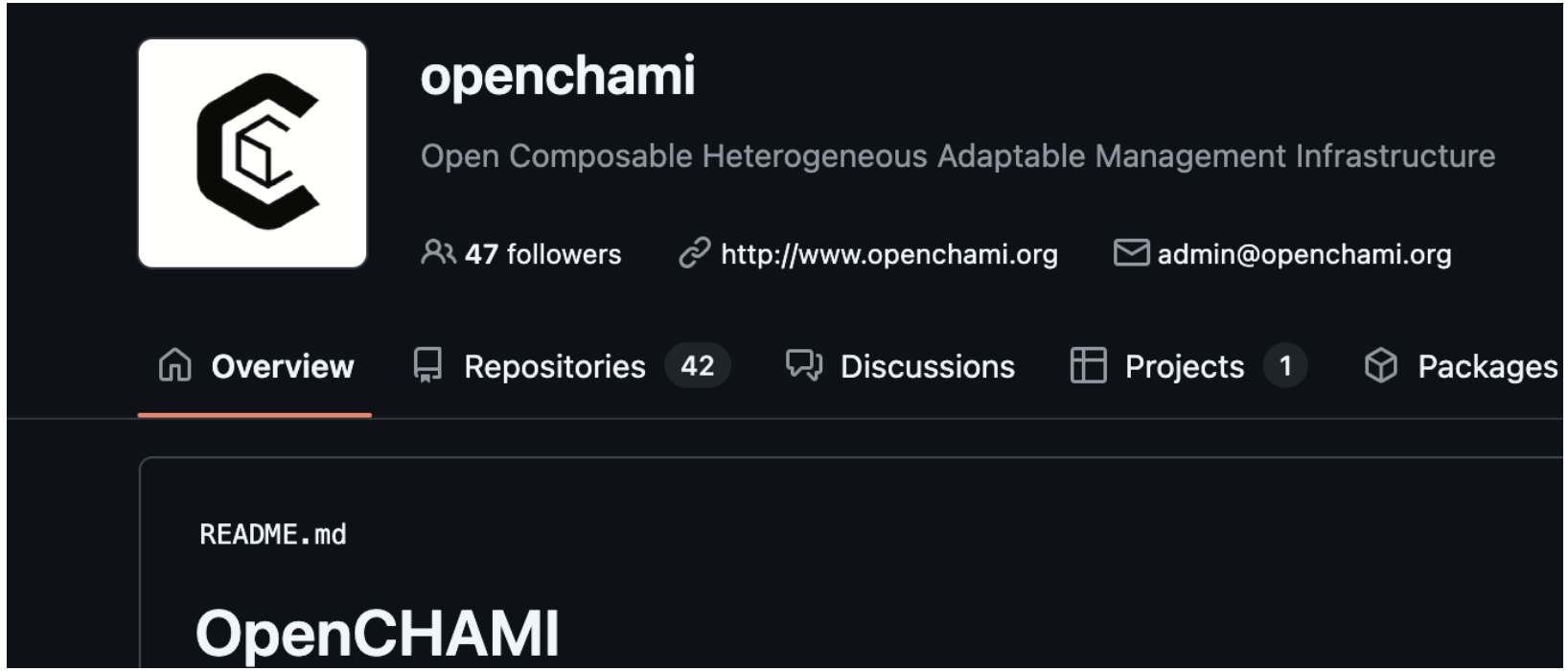
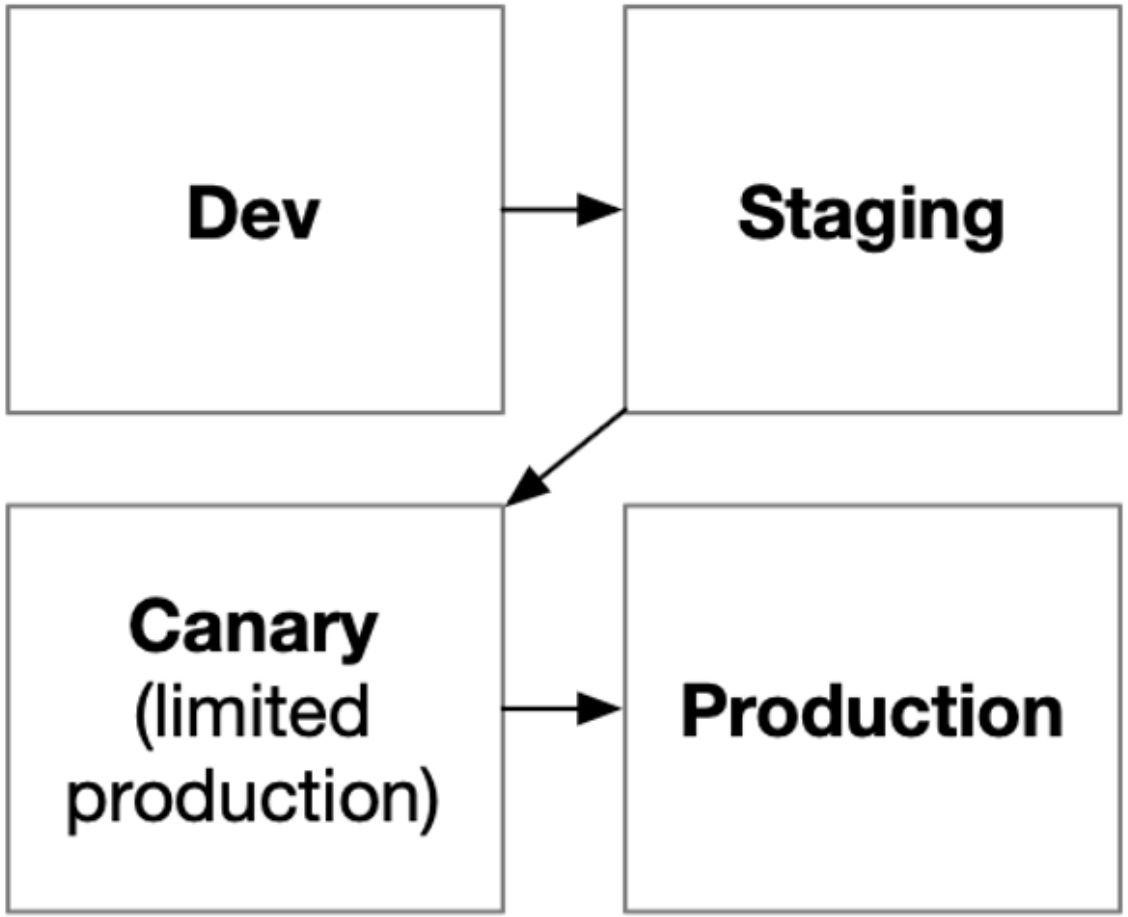


Image 3.7.1 - Environment promotion sequence



Development
Develop experiments in isolation

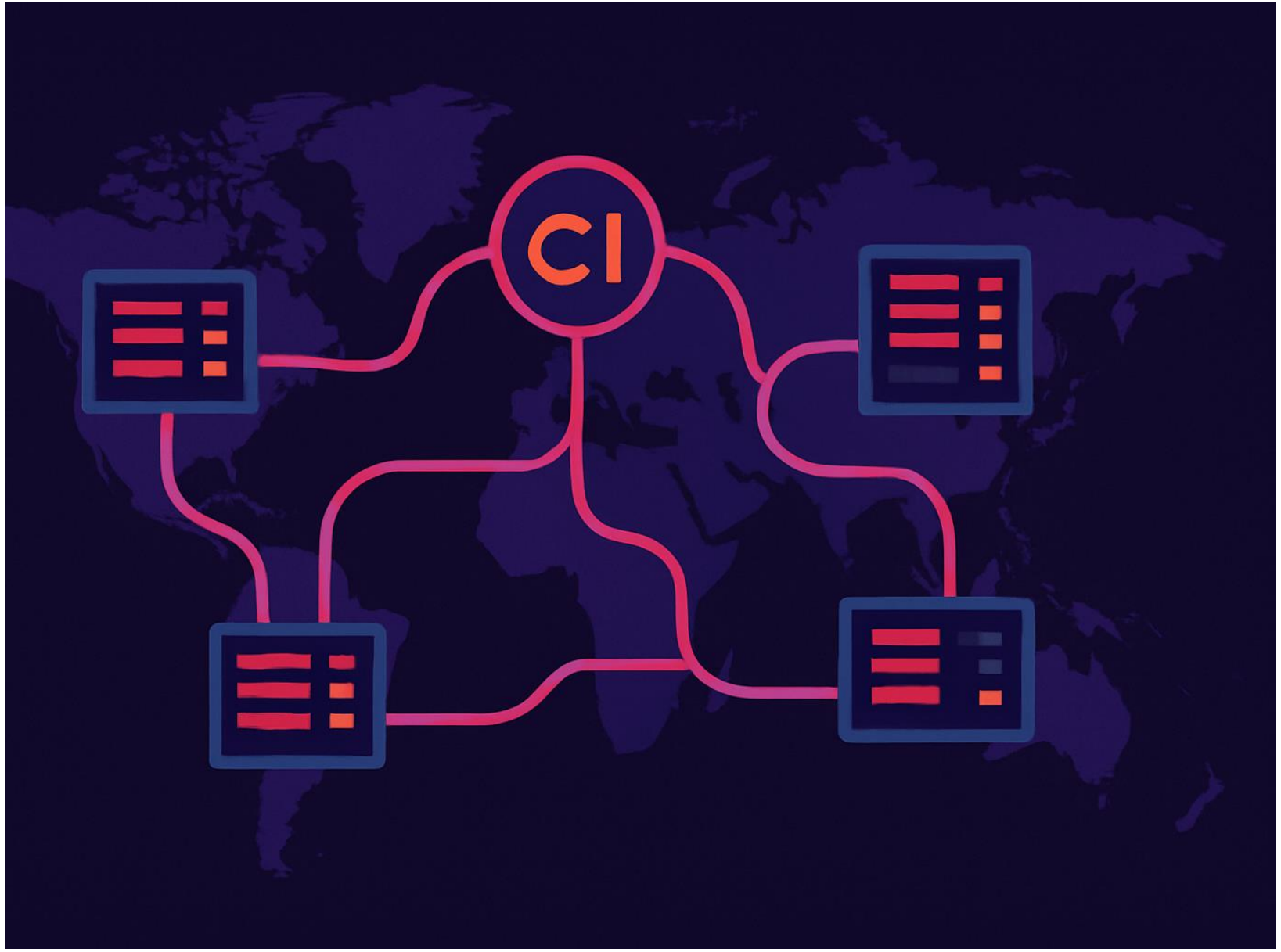
Staging (Integration)
Integrate experiments to confirm stable

Canary
Limited production deployment validating production configuration

Production
Typically deployed in a rolling fashion to limit downtime. Often, the first glimpse of scale in HPC.

Multi-Environment Automation Best Practices

- Single source of truth
- Centralized, external orchestration
  - e.g. Ansible and Jenkins
- Protected audit logs
- Modular pipelines,
  - CSM compute, HPCM admin, Job scheduler
- Pipeline of pipelines



Summary

- Externalize version control
- Version control everything
- Create pipelines for small actions
- Release via pipeline of pipelines
- Prioritize automation development according to the frequency of change
- Savings:
  - **hours** per compute change
  - **days** per environment and
  - **weeks** across multiple

Repos available. If interested, message me at dennis.walker@hpe.com

Thank you

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