MODERNISING THE MONOLITH:
AUTOMATING ON-PREM LIKE THE CLOUD

ROB GWILLIAM- JULY 2023

ROB GWILLIAM

Name: Rob Gwilliam

Role: Linux Infrastructure Architect

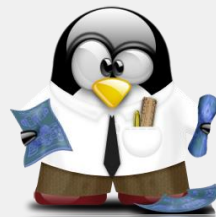Contracted to: Army Digital Services (Army HQ)

ARMY DIGITAL SERVICES (ADS)

COL. MARK CORNELL
ASSISTANT HEAD, INFORMATION APPLICATION SERVICES
BRITISH ARMY

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ARMY DIGITAL SERVICES (ADS)

"THE ARMY SOFTWARE HOUSE"

Military

Civil Servants

160+ Staff

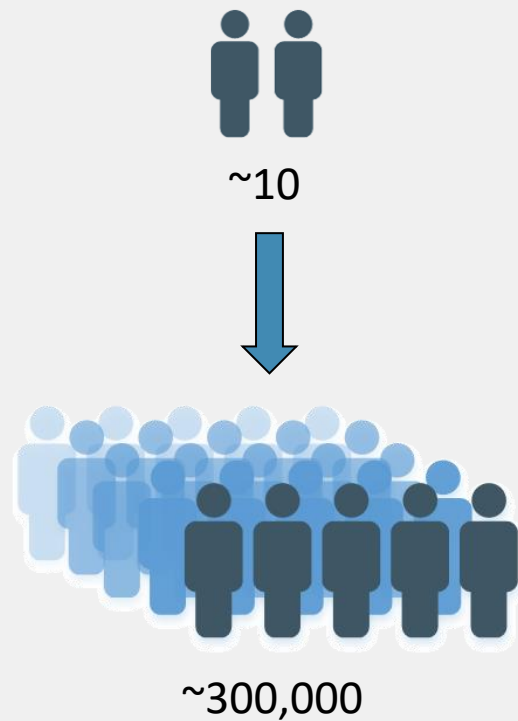**External Assistance Partners**

200+ Services

Public

Official Sensitive

Secret

3 Security Domains

Army, Navy & Air Force

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ARMY DIGITAL SERVICES (ADS)

CUSTOMERS

~10

~300,000

Training Recruits

Families

Injured

Regular

Reserves

Veterans

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INFRASTRUCTURE
DOMAINS

Public Cloud

Official Sensitive
Private Cloud

Secret
Private Cloud

Oracle Cloud Infrastructure

Army Hosting Environments

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INFRASTRUCTURE
INFRASTRUCTURE SOFTWARE

Hardware:
PURE STORAGE · CISCO · hp

Virtualization:
vmware® · vmware NSX

Operating Systems:
Windows Server · Red Hat Enterprise Linux

Azure DevOps
CI/CD Automation Services:

DevOps Automation Services:
vmware® vRealize Suite · Red Hat Ansible Automation Platform

ORACLE® APPLICATION EXPRESS · Microsoft® .NET
ADS Development: Microsoft Dynamics CRM

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ARMY HOSTING ENVIRONMENT

HOSTED APPLICATIONS

HR

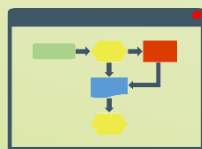Geo Mapping

CRM

ERP
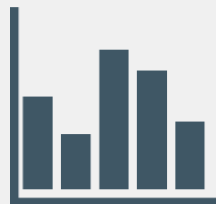
Analytics

Secure Comms

ARMY
Hosting Environment

Accounting

Legal

Planning

Data Warehouse

Training

Logistics

OCP
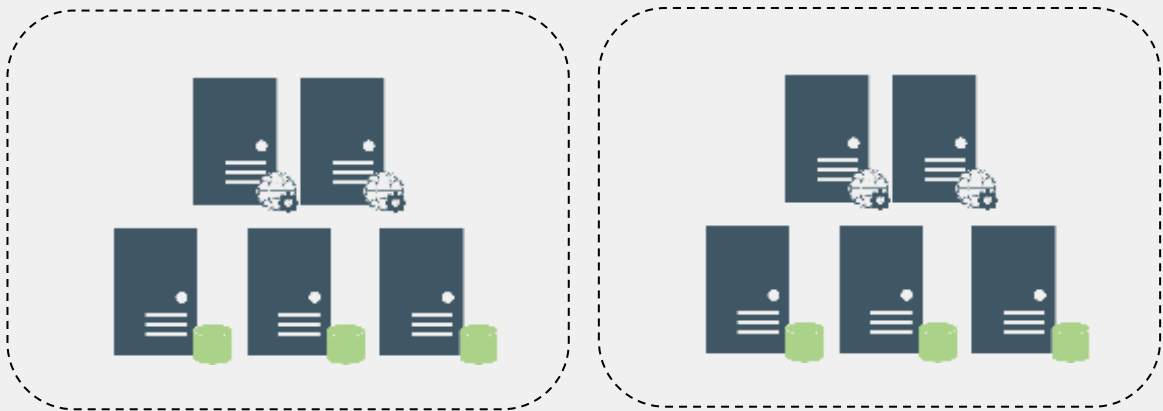
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Oracle Consolidated Platform

ADS DEVELOPED APPLICATIONS
THE MONOLITH

Production & Pre-Production

### Development & Test (SDLC)

ADS DEVELOPED APPLICATIONS
OCP UPGRADE MAINTENANCE

We have several platform types with differing configurations

- OS updates need applying

- Oracle CPUs need installing

- Schedule time to apply updates with DEV team

- Manual platform changes caused unpredictable errors

- **Business focus** tended towards application pipeline so platforms sometimes withered:

  This would leave inconsistent Oracle environments, not compatible with test and later production builds.

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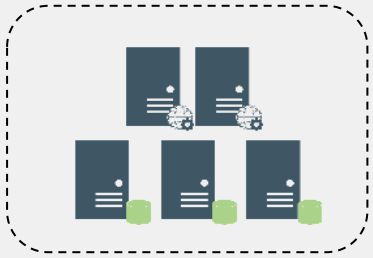
ADS DEVELOPED APPLICATIONS
OCP UPGRADE MAINTENANCE

The Production Builds were protected from "risk"

- Updates could have the potential to risk availability to the users

- "Hands on" emergency patching not reflected in the change process could again cause glitches with automation

- Business preferred that updates to be isolated:

  Week 1: OS
  Week 2: Oracle CPUs

- This compounded downtime and tied up the devops team needlessly

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ADS DEVELOPED APPLICATIONS

OCP UPGRADE MAINTENANCE

THE OCPv3 PLAN

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ADS DEVELOPED APPLICATIONS
PLATFORM BUILDS DAY

```
HOST_TYPE+VARIANT VM_ATTRIBUTES:
{
  DISK_SIZES:
  MEMORY:
  CPUs:
}
```

What are our ambitions?

We would like:

- 100% OCP estate defined in code

- 100% of code for running initial provisioning, day1 **and** all day2 upgrades

- 100% same code for every target environment:

    SDLC
    PRODUCTION at OFFICIAL/SENSITIVE
    PRODUCTION at SECRET
    Hopefully, external cloud instances..

- 100% automation with a single-entry point

ADS DEVELOPED APPLICATIONS

Consolidation

DSIP

GOLD IMAGE

ADS DEVELOPED APPLICATIONS
Consolidation

Red Hat Enterprise Linux

19ᶜ ORACLE Database

DSIP

Apply CPUs for all Oracle products

Apply any DSIP

New "GOLD" certs installed if invalidated due to time.

OS updates applied

GOLD IMAGE

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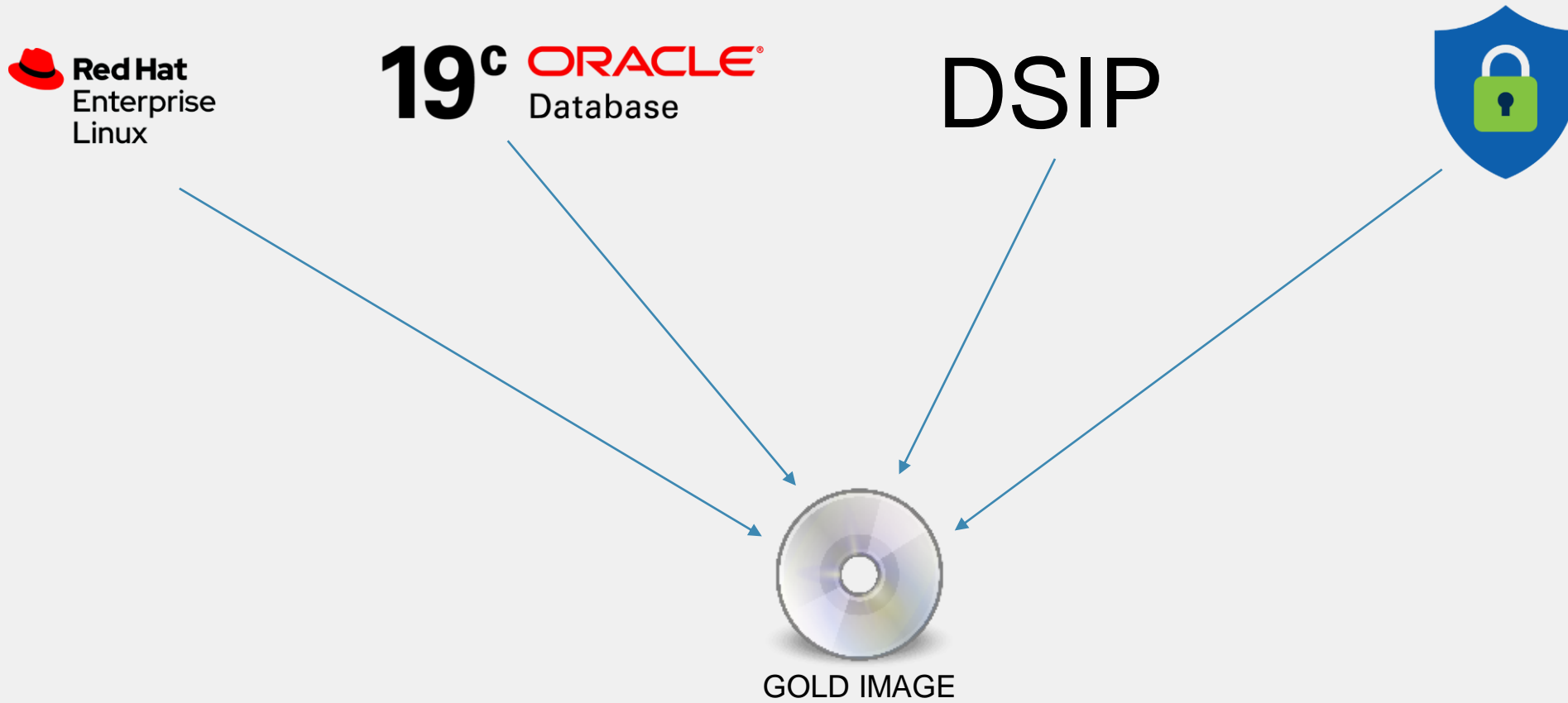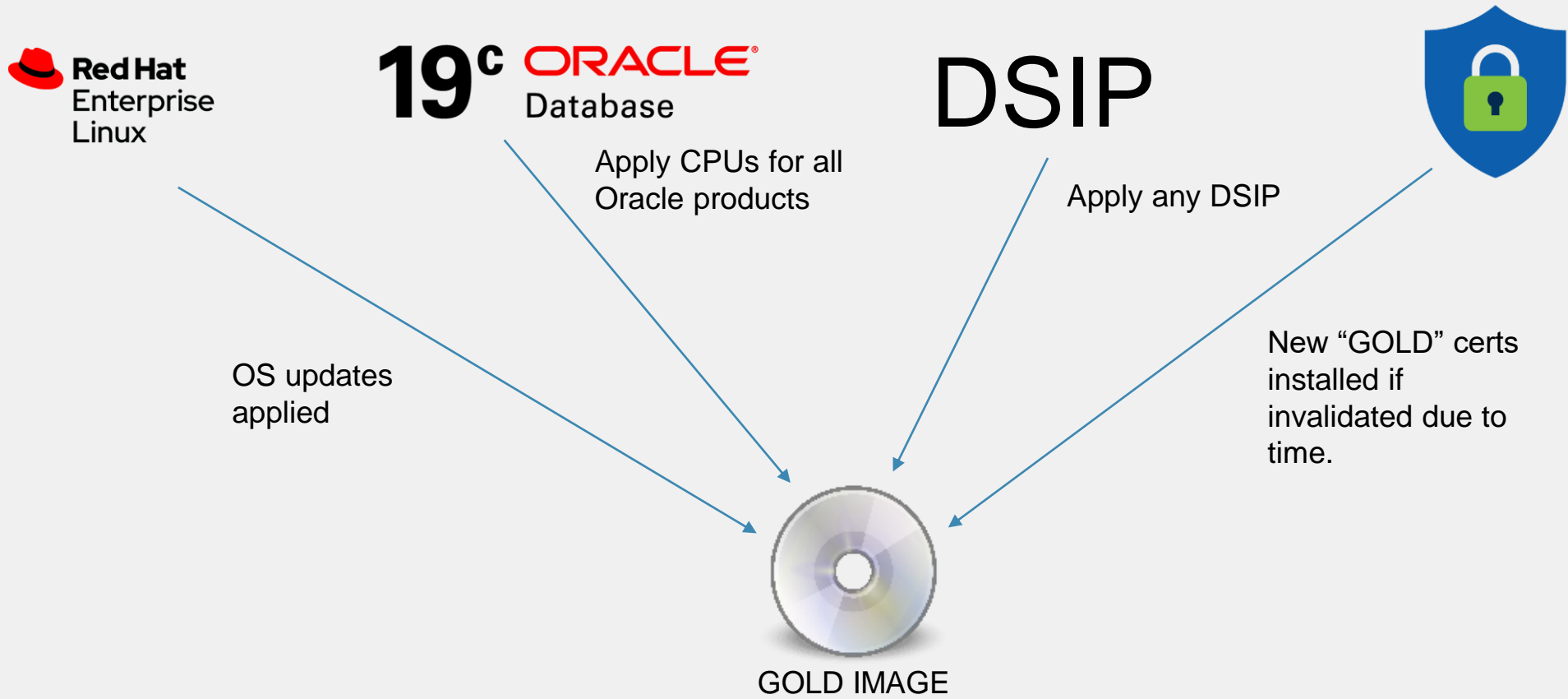
ADS DEVELOPED APPLICATIONS
PLATFORM BUILDS

Day1 Builds

- New platform builds should be straight forward – there are no users yet, so build out in advance of migration

Day2 Builds

- How can we build out a platform without affecting existing users?

We need a mechanism to build a parallel platform and defer migration of users

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ADS DEVELOPED APPLICATIONS
PLATFORM BUILDS DAY[12]

Day1 Builds

- New platform builds should be straight forward – there are no users yet, so build out in advance of migration

Day2 Builds

- How can we build out a platform without affecting existing users?

We need a mechanism to build a parallel platform and defer migration of users

We named this:

BLUE / GREEN

ADS DEVELOPED APPLICATIONS
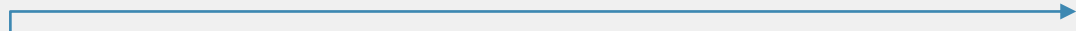# ESTATE DISCOVERY & MAPPING
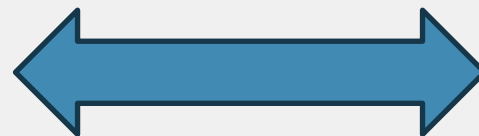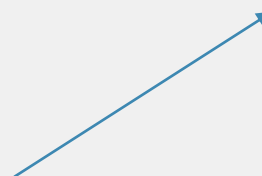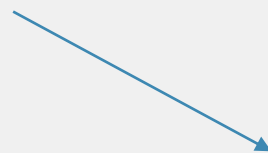
ADS DEVELOPED APPLICATIONS
ESTATE DISCOVERY & MAPPING

Configurations:

```
PLATFORM NAME:
{
 {
   HOST_LIST: hostname, host_type, variant, colour, vcenter
 } …
 OCP_BUILD_TYPE
 TOWER_ORGINIZATION
 TOWER_INVENTORY_NAME
}
```

ADS DEVELOPED APPLICATIONS
ESTATE DISCOVERY & MAPPING

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```
VCENTER_DEFAULTS:
{
 CLUSTER_NAME:
 PRIMARY NETWORK ADAPTER:
 MASK:
 GATEWAY:
 DISK_FORMAT:
}
```

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ADS DEVELOPED APPLICATIONS
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ADS DEVELOPED APPLICATIONS
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Red Hat
Ansible Automation
Platform

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ADS DEVELOPED APPLICATIONS
PROVISIONING

RHEL7 FAST PROVISION OCPV3 PLATFORM APC-PP

SURVEY   PREVIEW

* FRONT END HOSTNAME

The FRONT END hostname

OCPENG501

* GREEN OR BLUE INSTALL

GREEN or BLUE install

GREEN

* GOLD IMAGE CLONE TEMPLATE NAME

The Name of the TEMPLATE to clone VMs

ocpgold701-A-06-02-23

CANCEL   **NEXT**

Red Hat
Ansible Automation
Platform

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ADS DEVELOPED APPLICATIONS
PROVISIONING

The process we would build would be almost identical for day1 and day2 operations:

- We decided all day1 operations would build out the GREEN deployments

- All day2 builds would move the running GREEN into a new BLUE instance.

- Day2+ would see a move from running BLUE, back to running GREEN.

All of our Ansible code would be functional for both scenarios – this was key to simplification of the install process

Day 1

Day 2

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PROVISIONING

OCP in AHE

OCP in AHE

ADS DEVELOPED APPLICATIONS
PROVISIONING

RHEL7 FAST PROVISION OCPV3 PLATFORM APC-PP

[SURVEY] [PREVIEW]

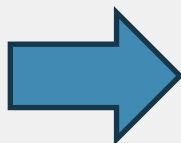*** FRONT END HOSTNAME**
The FRONT END hostname

| OCPENG501 | ▾ |

* GREEN OR BLUE INSTALL
GREEN or BLUE install

| GREEN | ▾ |

* GOLD IMAGE CLONE TEMPLATE NAME
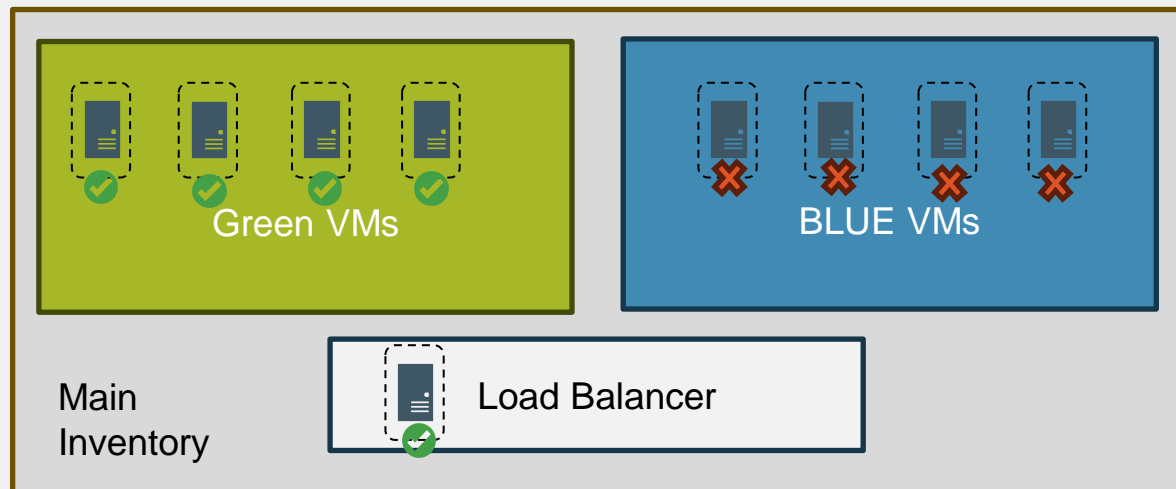*The Name of the TEMPLATE to clone VMs*

| ocpgold701-A-06-02-23 | ▾ |

[CANCEL] [NEXT]

fast build.yml

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ADS DEVELOPED APPLICATIONS

PROVISIONING

RHEL7 FAST PROVISION OCPV3 PLATFORM APC-PP

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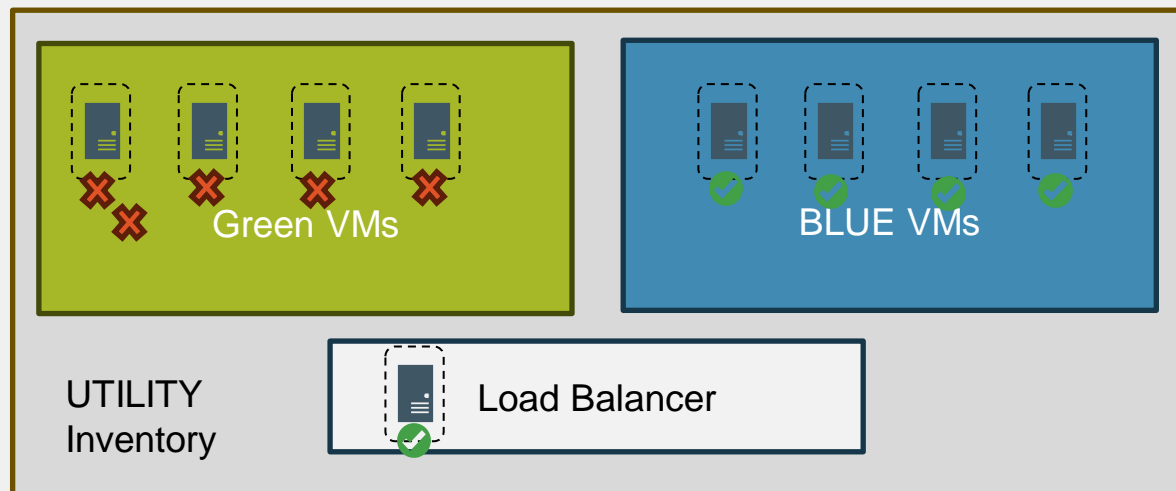*The Name of the TEMPLATE to clone VMs*

ocpgold701-A-06-02-23

CANCEL NEXT

fast build.yml

tower-cli

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ADS DEVELOPED APPLICATIONS

PROVISIONING

fast build.yml

tower-cli

Green VMs

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PROVISIONING

RHEL7 FAST PROVISION OCPV3 PLATFORM APC-PP

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CANCEL   NEXT

`fast build.yml`

`tower-cli`

Green VMs

BLUE VMs

Load Balancer

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ADS DEVELOPED APPLICATIONS

PROVISIONING

RHEL7 FAST PROVISION OCPV3 PLATFORM APC-PP

SURVEY   PREVIEW

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ocpgold701-A-06-02-23

CANCEL   NEXT

`fast build.yml`

`tower-cli`

Green VMs

BLUE VMs

UTILITY
Inventory

Load Balancer

Green VMs

BLUE VMs

Main
Inventory

Load Balancer

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ADS DEVELOPED APPLICATIONS
PROVISIONING

De-register   Backup   Preserve   Preserve
From OMS   BIEE   passwords   keys

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Populate   Process   Add VMs   Rebuild   Join AD   General   Set
TSS*   TLS Cert   Oradata/   OS tasks   ORACLE
                                        FRA   to work

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ADS DEVELOPED APPLICATIONS
PROVISIONING

Red Hat
Ansible Automation
Platform

De-register From OMS | Backup BIEE | Preserve passwords | Preserve keys

UTILITY Workflow

MAIN Workflow
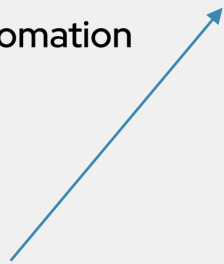
Populate TSS* | Process TLS Cert | Add VMs | Rebuild Oradata/ FRA | Join AD | General OS tasks | Set ORACLE to work

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ADS DEVELOPED APPLICATIONS
PROVISIONING

HOST_TYPE+VARIANT VM_ATTRIBUTES:
{
 DISK_SIZES:
 MEMORY:
 CPUs:
}

 VCENTER_DEFAULTS:
 {
  CLUSTER_NAME:
  PRIMARY NETWORK ADAPTER:
  MASK:
  GATEWAY:
  DISK_FORMAT:
 }

GOLD IMAGE

ADS DEVELOPED APPLICATIONS
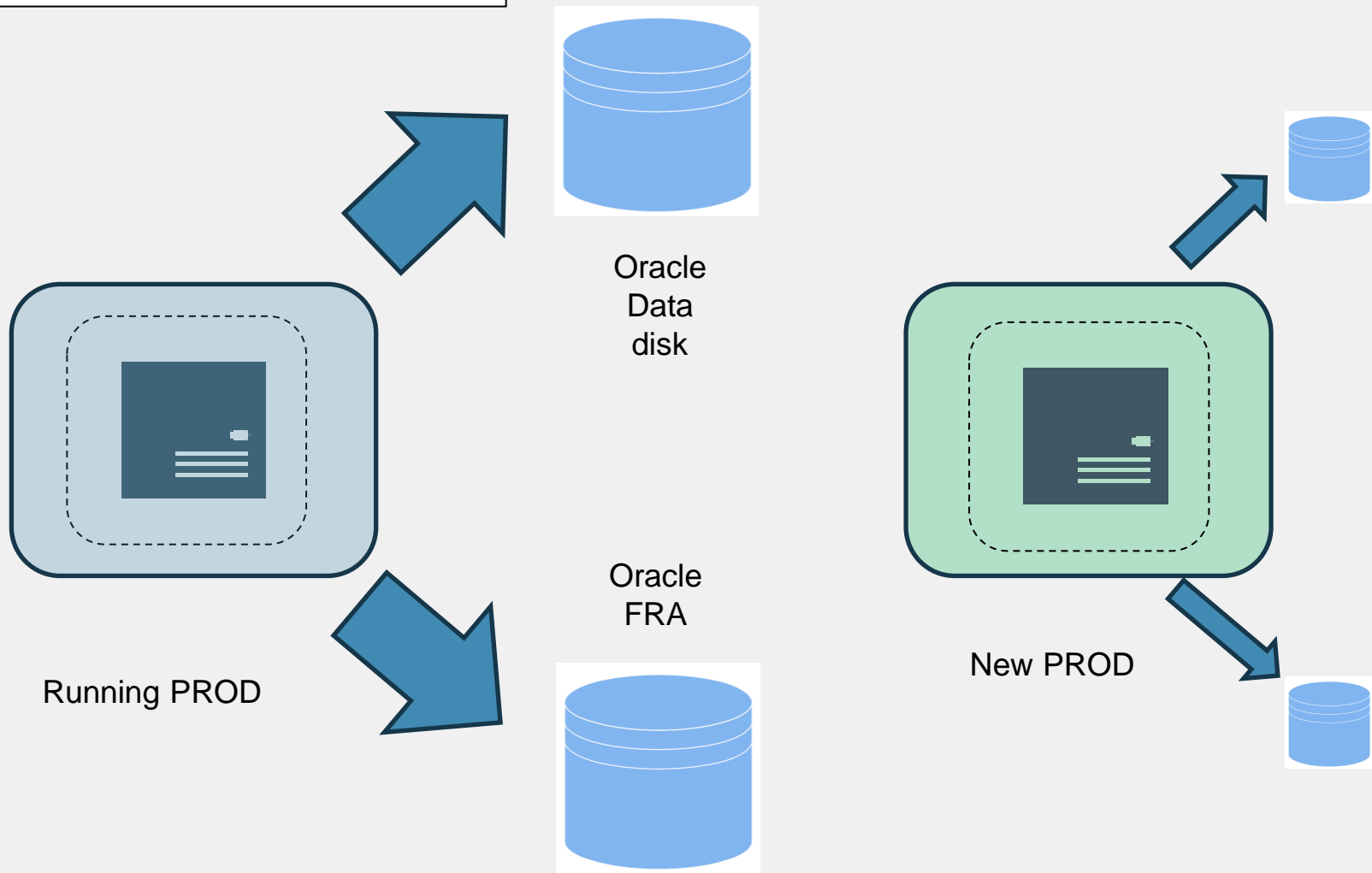# PROVISIONING

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Ansible Automation
Platform
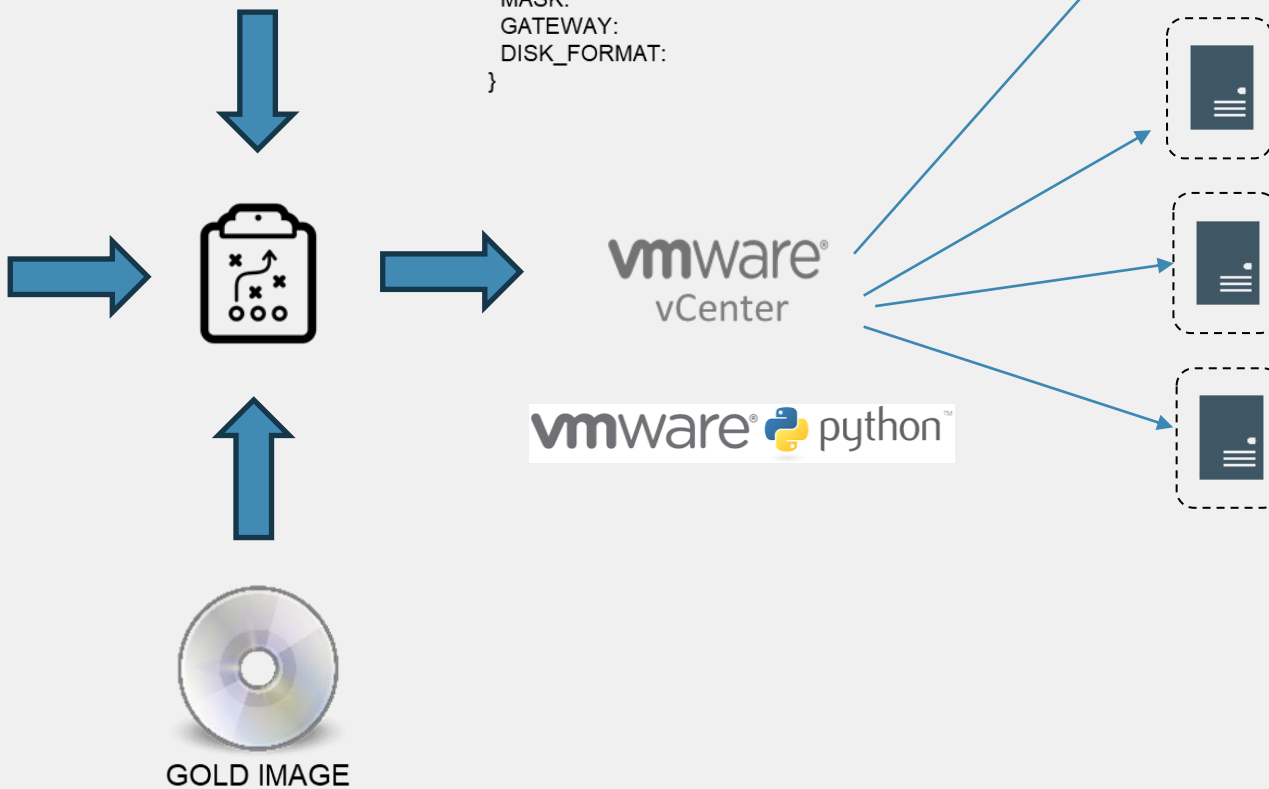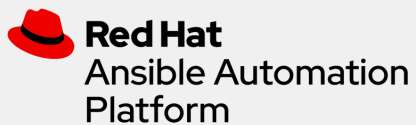
Deploy AHE Toolset

Change Logo

Join Active Directory

Enable Nessus

Configure Patching

Enable Solarwinds

Set System Passwords

Apply DSIP

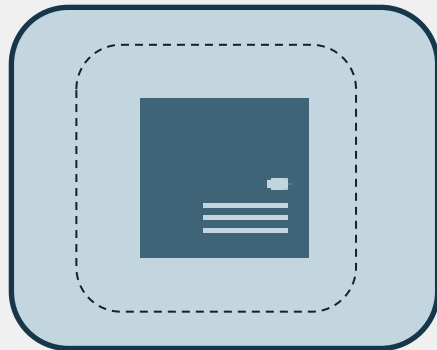Configure banners

Apply BOS Updates

General OS tasks

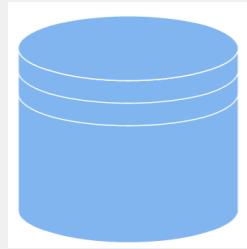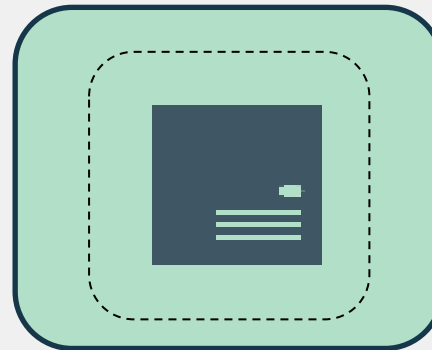# ADS DEVELOPED APPLICATIONS
PLATFORM UPDATE

Oracle
Data
disk

Oracle
FRA

Running PROD

New PROD

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ADS DEVELOPED APPLICATIONS
PLATFORM UPDATE

Oracle
Data
disk

POWER
DOWN

Oracle
FRA

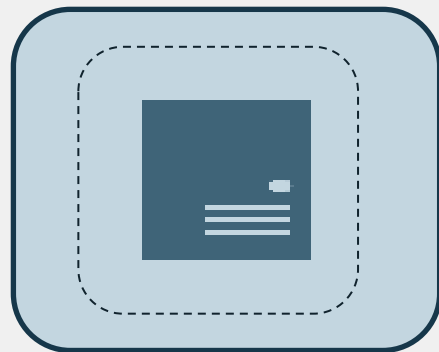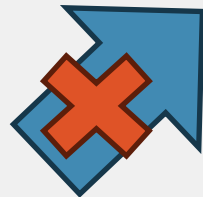POWER
UP

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ADS DEVELOPED APPLICATIONS
PLATFORM UPDATE

HAPROXY

Oracle
Data
disk

Oracle
FRA
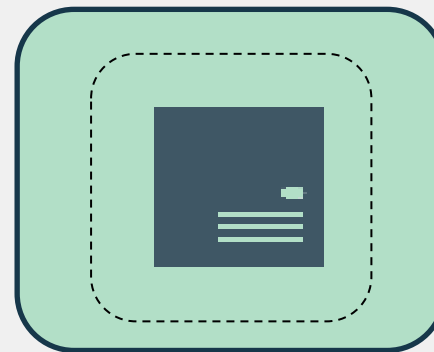
POWER
DOWN

POWER
UP

Data
migration

Haproxy
update

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ADS DEVELOPED APPLICATIONS
PLATFORM UPDATE
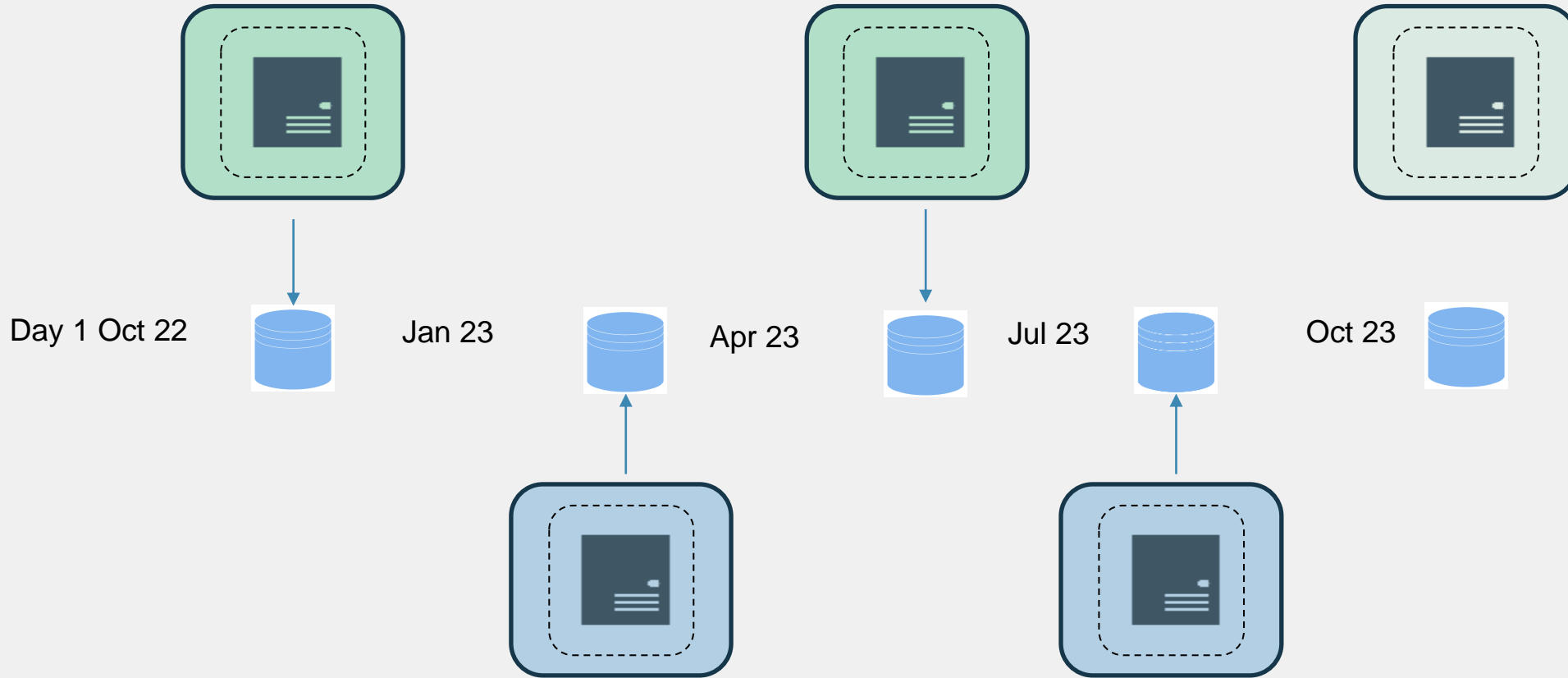

Day 1 Oct 22   Jan 23   Apr 23   Jul 23   Oct 23

ADS DEVELOPED APPLICATIONS
BENEFITS

Development teams now have precisely updated platforms

Each update provides new baseline – any manual changes are removed

- All platforms become identical ✅

We can build out new platforms rapidly

- We've built new performance test platform in production – already fed back into application cycle ✅

Outage times per platform are virtually nothing – we can update a platform over a lunch break

- Application releases are scheduled much more efficiently – less platform related dependency problems ✅

My team is now able to focus on strategic projects

- Moving to AAP and AAP2 ✅
- RHEL 8/9 Secure build development ✅

Red Hat
Ansible Automation Platform

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THANK YOU