DevOps - Infrastructure As Code

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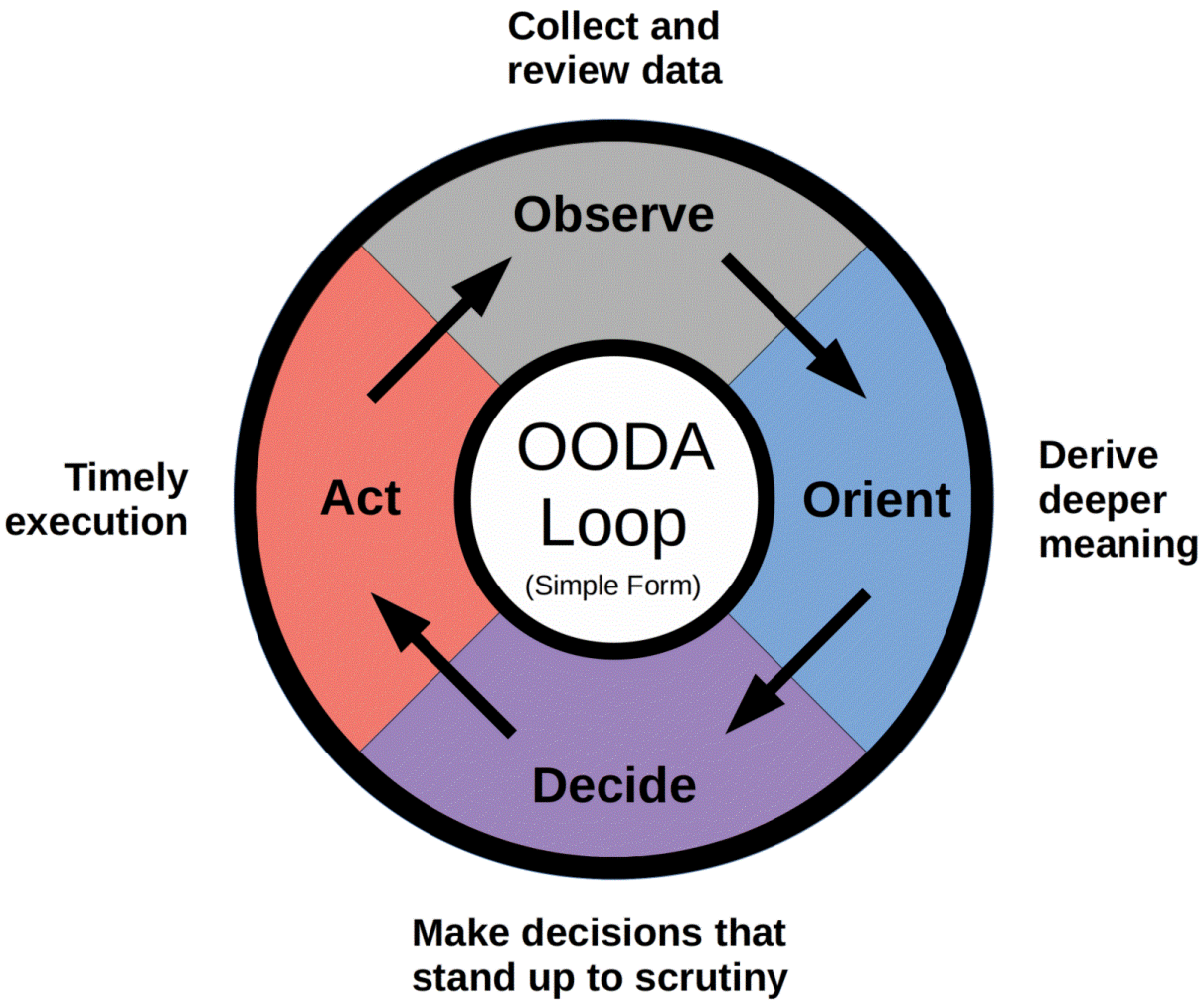
Agenda

- Overview of DevOps
- Infrastructure as Code (IaC) and Configuration as code
- Identity and Security protection in CI CD environment
- Monitor Health of the Infrastructure/Application
- Open Source Software (OSS) and third-party tools, such as Chef, Puppet, Ansible, and Terraform to achieve DevOps.

What is DevOps?

- "DevOps is the union of people, process, and products to enable continuous delivery of value to our end users.
- DevOps is a set of software development practices that combines software development (Dev) and information technology operations (Ops)
- DevOps is the optimization of the relationship between developers and information technology (IT) professionals.

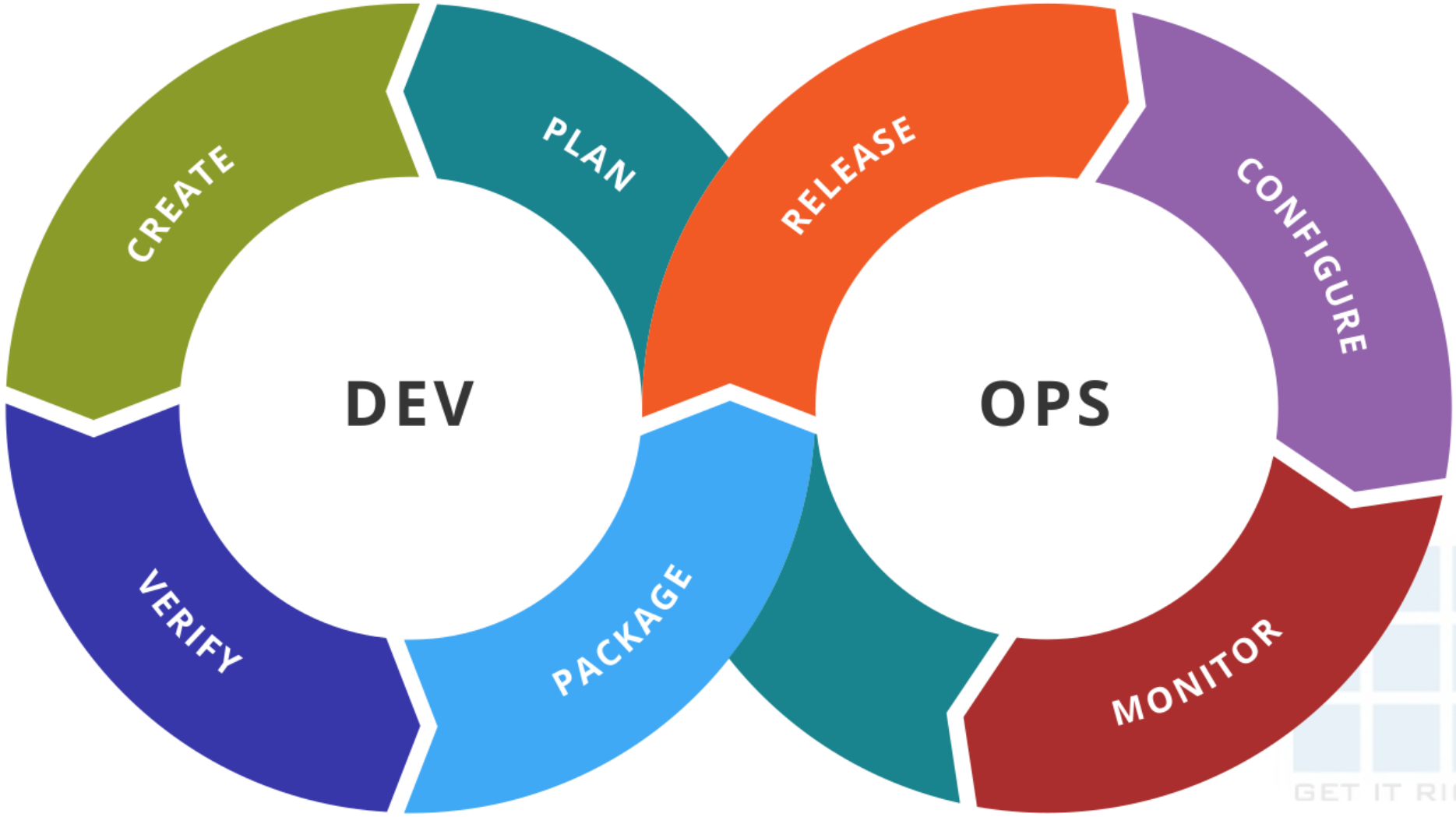
How DevOps works?



Why DevOps?

- Shorter development cycle.
- Increased deployment frequency , hence the changes are smaller at each individual release.
- Fast Delivery Cycles.
- Can test very specifically and goal is to create faster and faster release cycles with less and less change or impact to production.
- Get feedback rapidly, and learn from our customers at a much faster cadence.

DevOps Lifecycle



Infrastructure as Code (IaC)

- Manage and provision infrastructure though code and automation.
- It is a practice that enables the automation and validation, such as networks and virtual machines, to help deliver secure, stable application hosting platforms.

Problem with existing manual Infra setup

- Environment drift - Teams must maintain the settings of individual deployment environments.
- Snowflake environment - A unique configuration that cannot be reproduced automatically.
- Inconsistency - among environments leads to more issues during deployment.

Why Infrastructure as Code (IaC)

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- **Consistency:** perform repetitive, monotonous work and eliminate mistakes with help of configuration code file.
- **Reusability:** source control repository for your infrastructure.
- **Scalability:** Faster than their manual counterparts.
- **Self-documentation:** Improves the quality of the entire release process by standardizing important steps such as deployments.
- **Simplify the complexity:** Complex infrastructure can be stood up once they are defined as code.
- **Cost effective:** Automated processes cost less than manual work.

Azure and Infrastructure As Code

- Microsoft Azure is built with Infrastructure as Code (IaC) tools like Azure Resource Manager templet.
- Cross platform tools like Azure Command Line Interface or Azure PowerShell.
- Desired State Configuration (DSC) -
- Azure Blueprints.

Configuration Management

- **Maintainability:** change of state is consistent, stable manner.
- **Saves time:** Rollout changes simultaneously
- **Insights:** to your infrastructure
- Minimize the configuration drift.
- Similar to IaC but not the same.

Azure Tools

- ARM Template
- Azure CLI
- Desired State Configuration (DSC)
- Azure Blueprint

Azure DevTest Lab

Azure DevTest Labs is the infrastructure that encompasses a group of resources. A fast, easy and lean dev-test environments

- Quickly provision development and test environments
- Minimise waste resources with quotas and policies
- Set automated shutdowns to minimise costs
- Build Windows and Linux environments

Benefits of DevTest Labs

- Self-service cost control
- Quick custom templates
- Works with your CI/CD tools

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Identity and Security

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DevSecOps

- "**Secure DevOps Kit for Azure**" is a collection of scripts, tools, extensions, automations, etc. that caters to the end to end Azure subscription and resource security needs for dev ops teams using extensive automation and smoothly integrating security

Secure DevOps Kit for Azure

Read More: https://azsk.azurewebsites.net/README.html

- **Secure the subscription:** Check all settings are in conformance to a secure baseline
- **Enable secure development:** *Security verification tests* (SVTs) which can check for security of various resource types in Azure.
- **Integrate security into CICD:** SVTs as part of the VSTS CICD pipeline
- **Continuous Assurance:** Security scanning via Azure Automation Runbooks
- **Alerting & Monitoring :** Visibility of security status
- **Cloud Risk Governance:** Control/usage telemetry through Insights

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1. How to control or restrict the access?

2. How to keep the secrets and passwords safe?

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- Secure access to your resources with Azure identity and access management solutions.
  - Protect your applications and data
  - Defend against malicious login attempts
  - With the help of PIM leverage services like Conditional Access, Just-In-Time (JIT), Access reviews, notifications and audit history

- Safeguard cryptographic keys and other secrets used by cloud apps and services
  - Enhance data protection and compliance
  - All of the control, none of the work

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How to know everything is working fine.

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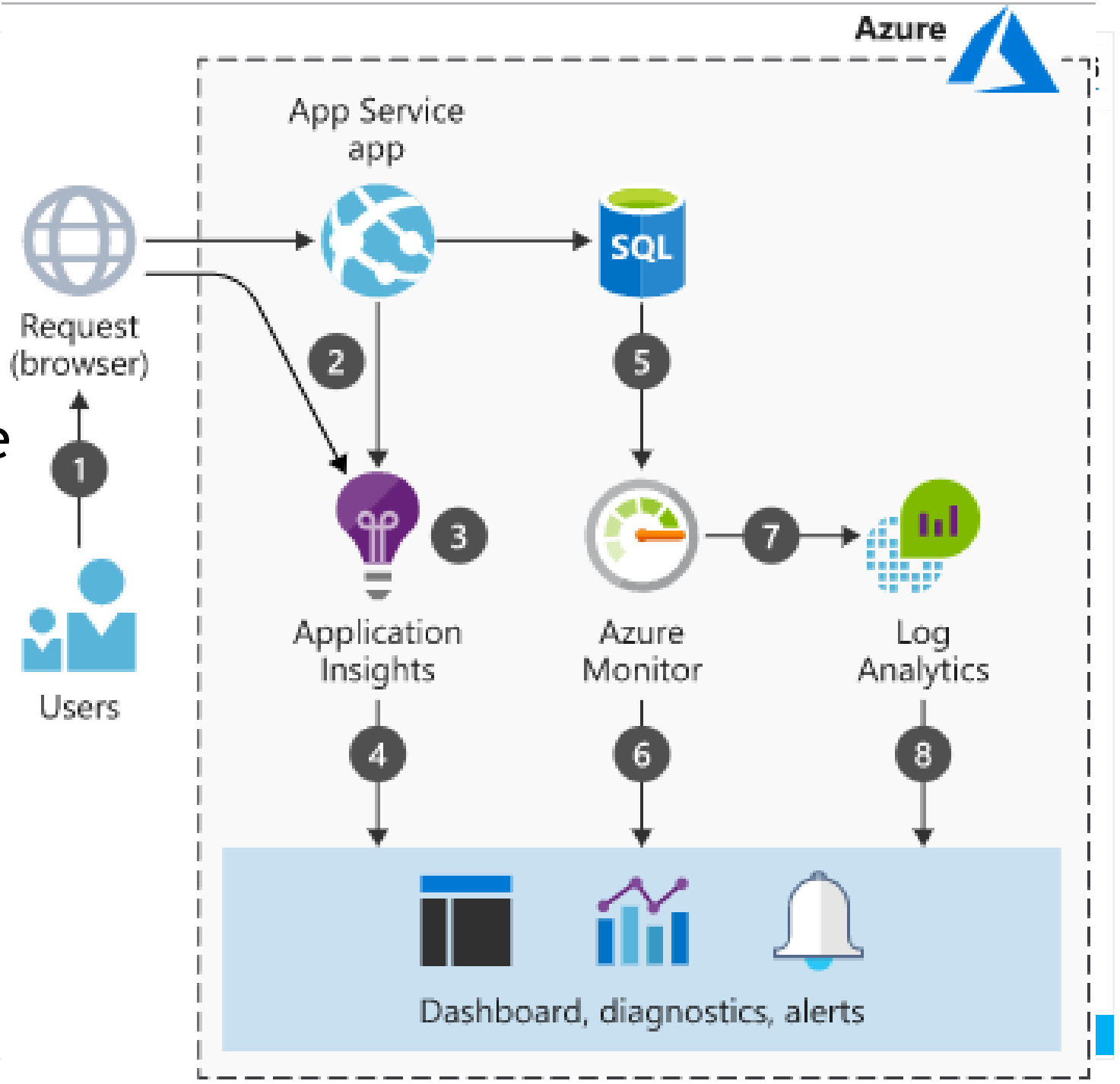
Monitoring the Infrastructure and Application



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Microsoft Azure Sentinel

Advanced and enhanced version of Security Information and Event Management (SIEM) which collects security data across the entire hybrid organization from devices, users, apps, servers on on-premise and cloud environment.

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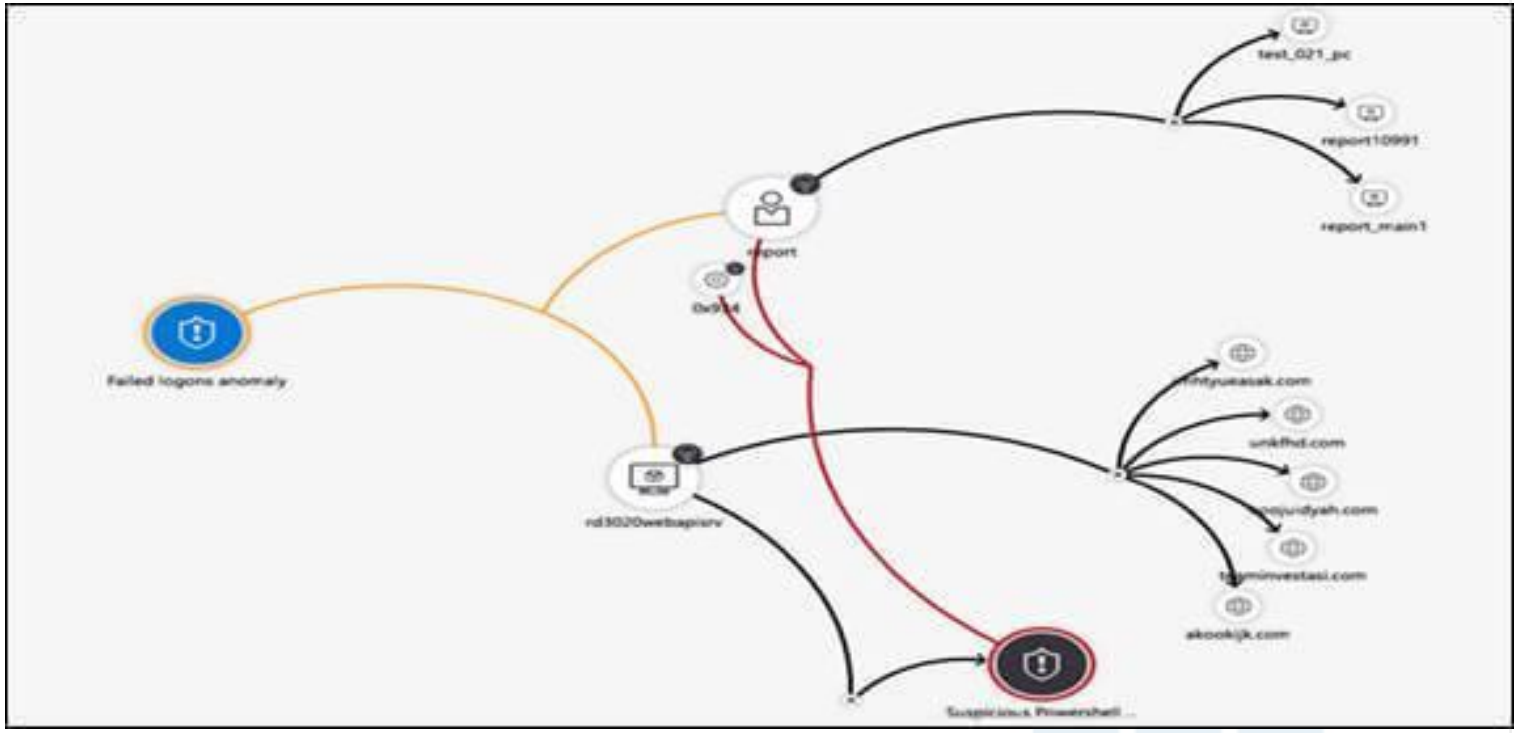
Benefits of Microsoft Azure Sentinel

- Collect data across the enterprise
- Analyze and detect threats with built-in AI
- Investigate and look for suspicious activities
- Automate common tasks and threat response



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Azure Sentinel is a service that provides a proactive and responsive cloud-native SIEM which will help customers simplify their security operations and scale as they grow. It acts as a centralized system in SecOps to protect, secure and prevent similar threat in your environment.

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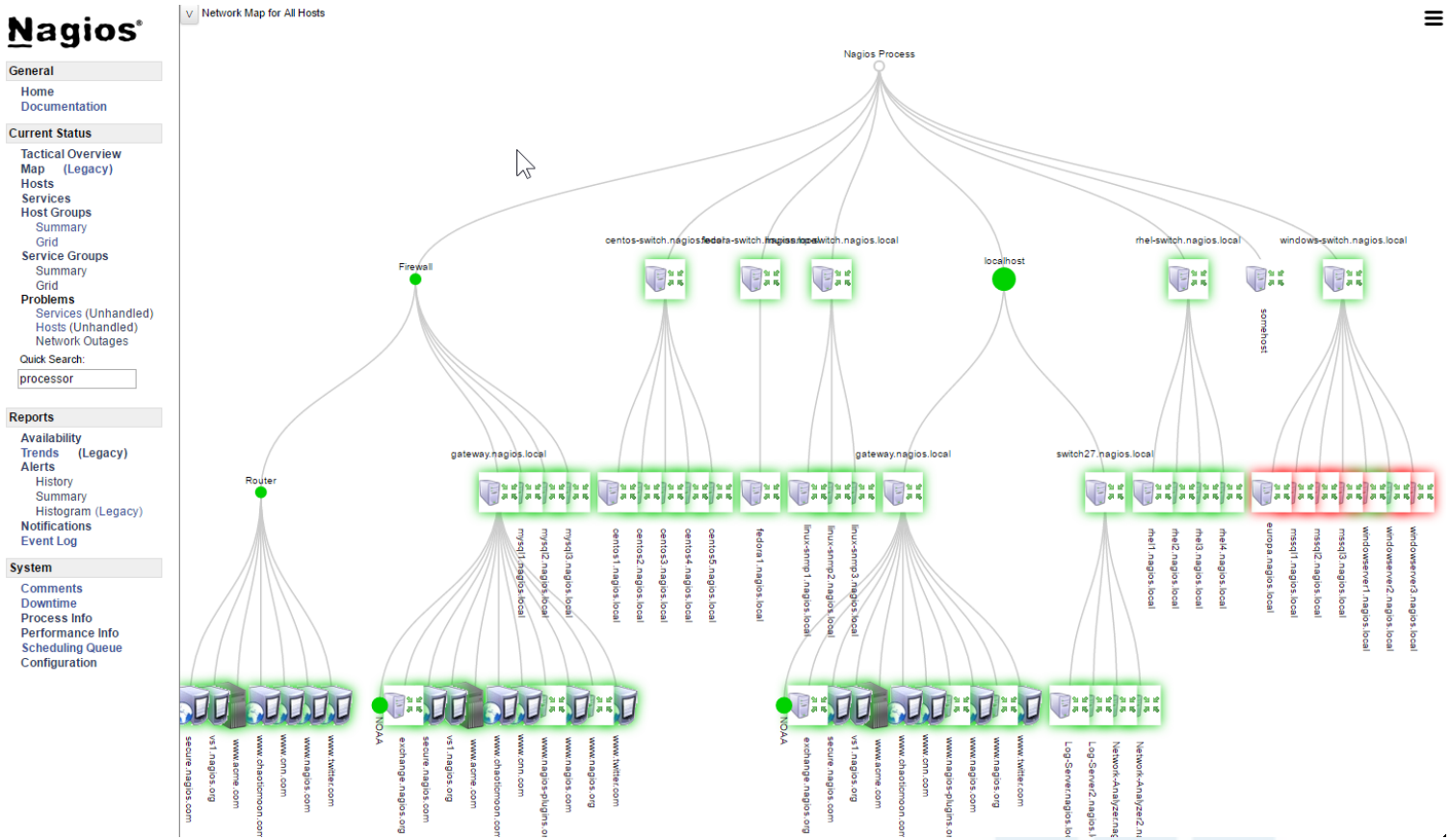
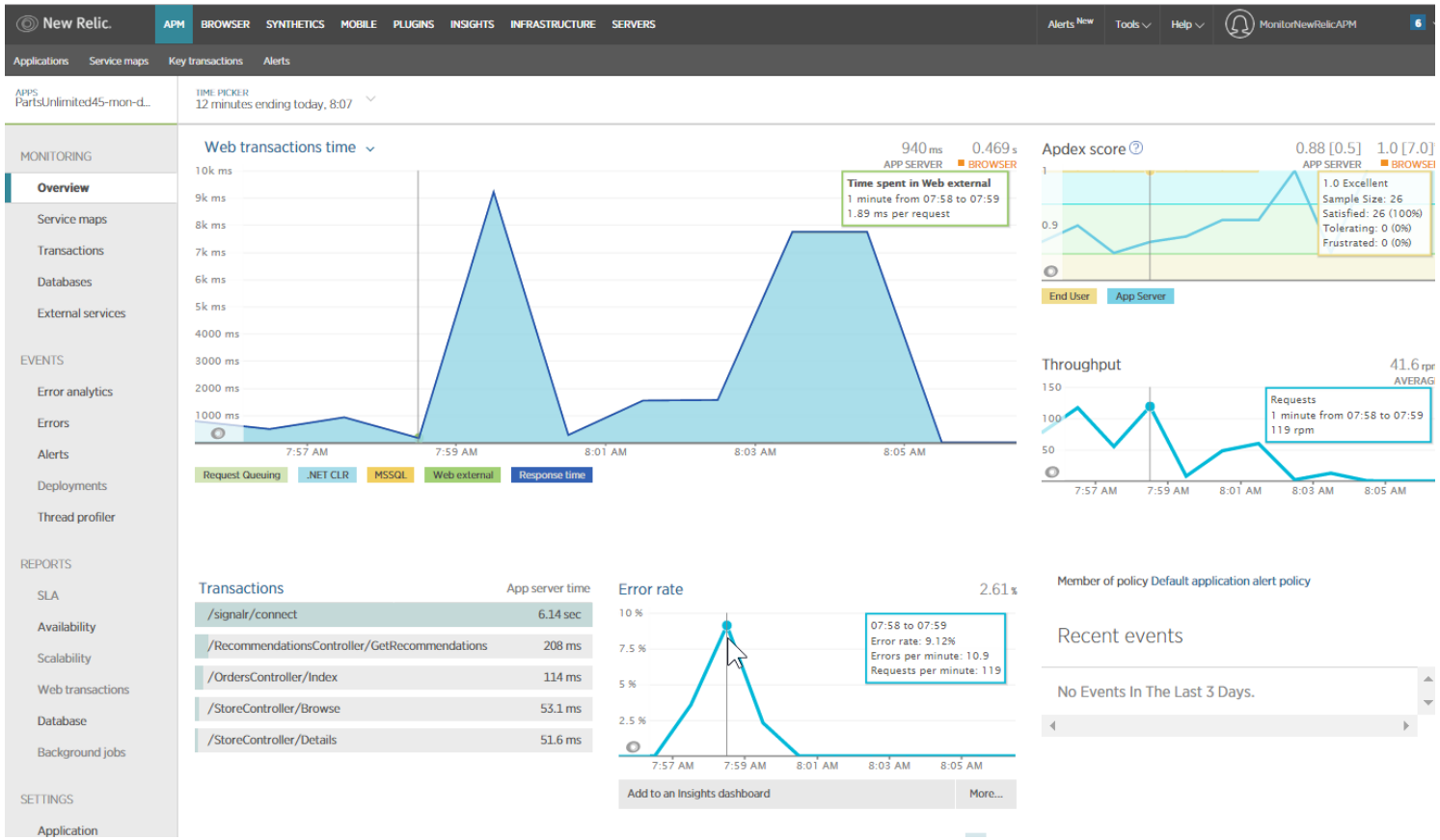
Other 3rd Party Monitoring tools

Nagios

- Infrastructure, Protocol, Application, Database, Log and Bandwidth monitoring solution
- Monitoring and alerting software for servers, networks, and applications.
- Event handlers for proactive problem resolution
- Free and open-source (Nagios Core)



Read More https://www.nagios.org/



New Relic

- Server and Application monitoring
- Real-time analytics
- Browser-side performance monitoring
- Automated tests to simulate user behavior
- Alerts to trigger actions and notifications on some conditions.
- Collect and visualize the data you want

Read More:
https://newrelic.com/

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Open Source Software (OSS) and third-party tools for DevOps

Am I using the tool with full extent?

Where to use which tool?

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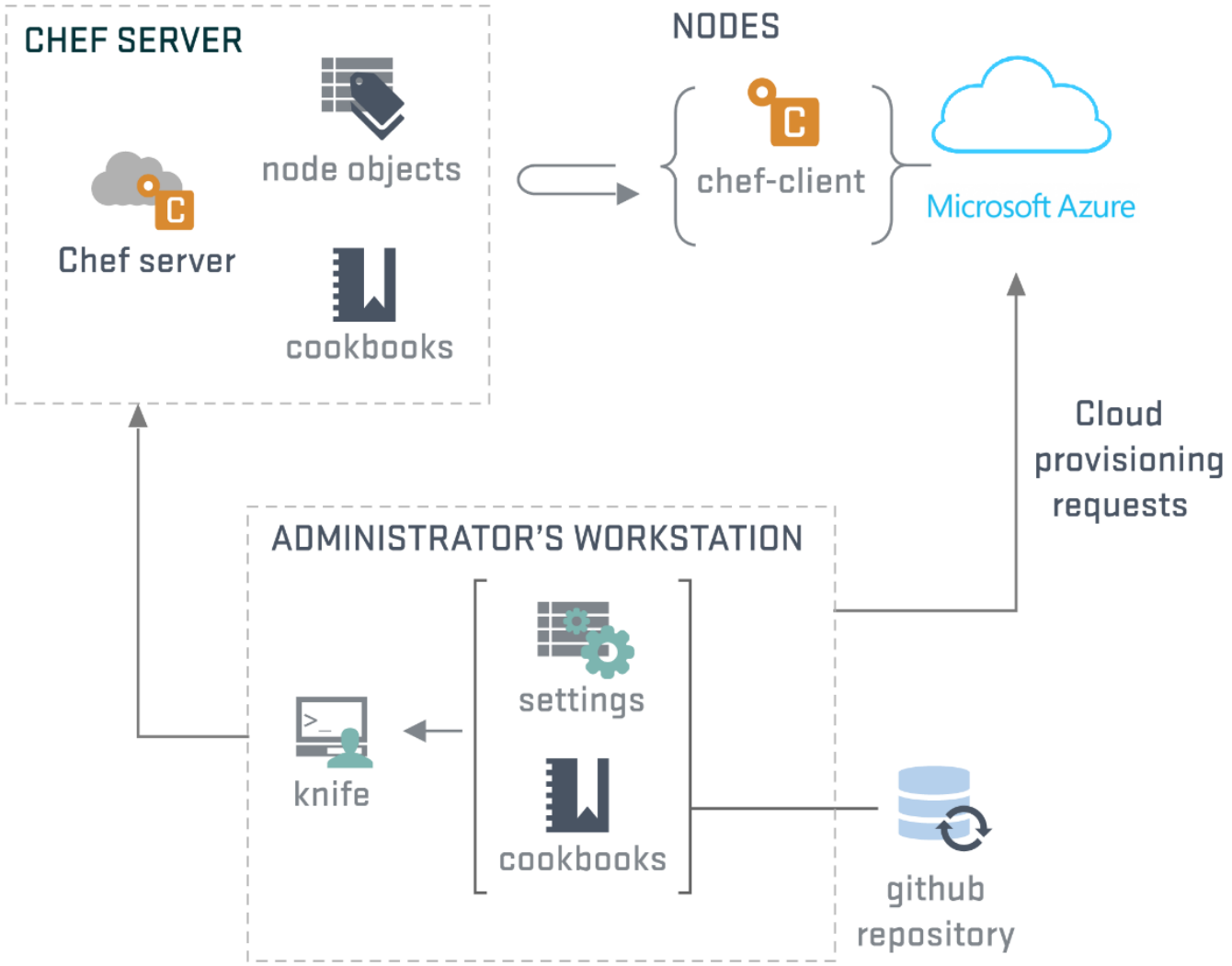
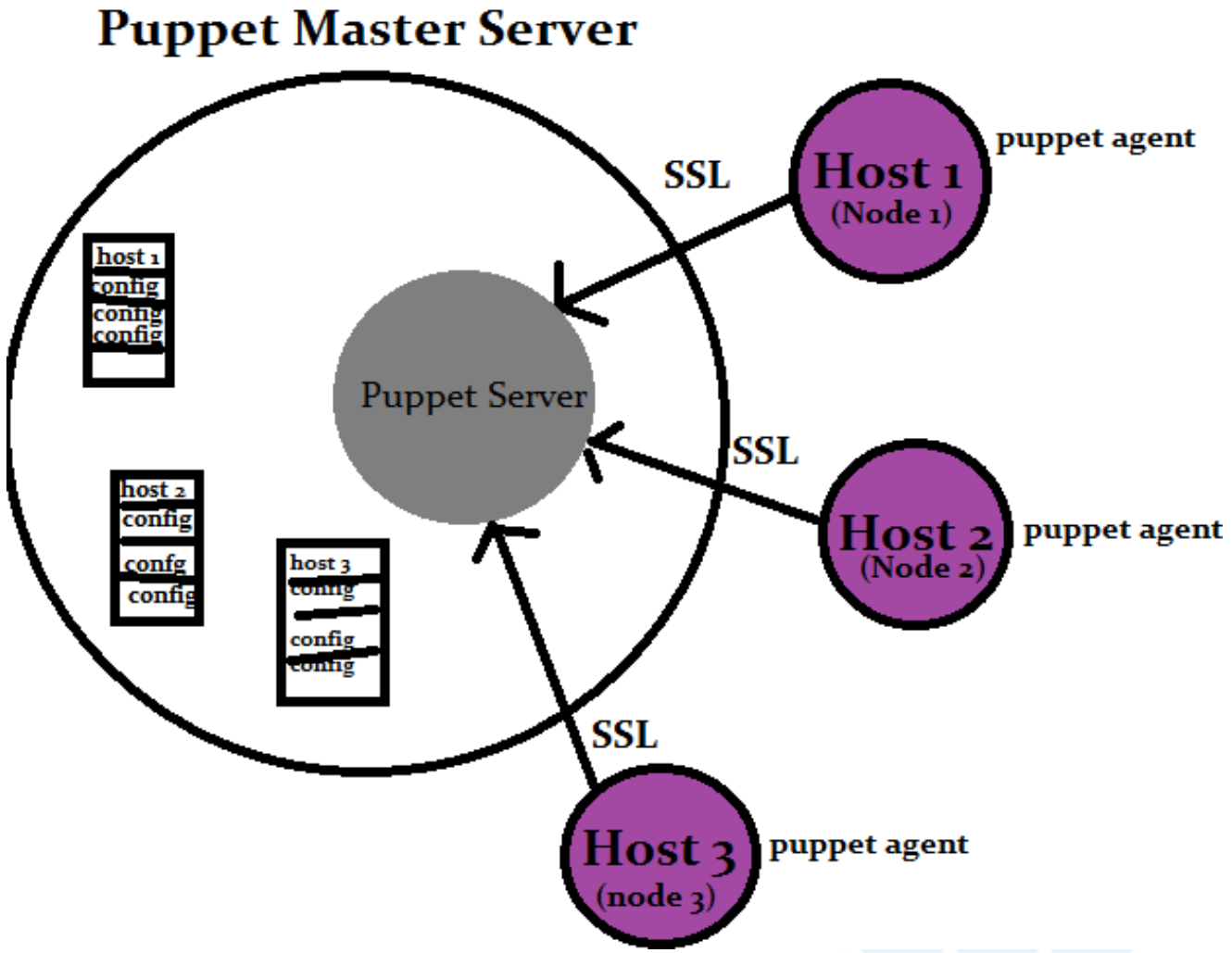
Chef

- Procedural Configuration
- Seamless integration with Azure with the Cloud API
- Server – Agent mechanism
- Chef Server, Chef Client (node), and Chef Workstation
- Has it's own chef DSL
- **knife** command from the Chef Workstation helps you to manage your infrastructure
- Chef Cookbook Templates helps you provisioning, configuration management.



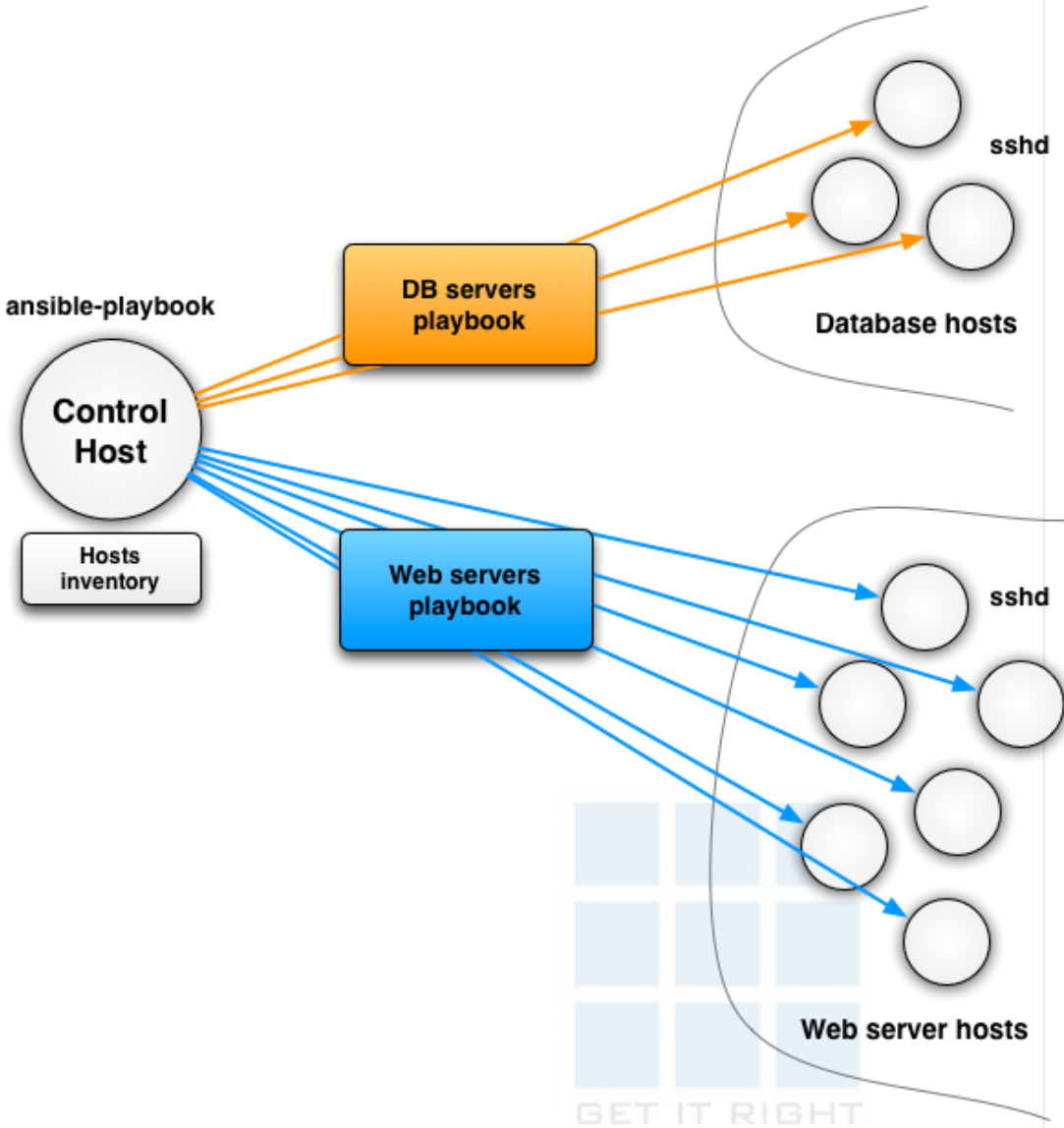
Puppet

- Declarative Configuration
- Managed state through UI
- Custom module uses puppet DSL
- Control Server Architecture with agents installed on clients



Ansible

- Open-source platform
- Automates cloud provisioning, configuration management, and app deployment
- Use declarative language
- Uses Ansible Playbook to deploy, configure and orchestrate
- Playbooks are structured with YAML
- Agent-less, unlike Puppet or Chef
- Ansible uses python, Secure Shell (SSH) for linux and remote PowerShell for windows
- No centralized/control server (but you can have ansible tower if required)



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Ansible Demo

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References

- https://docs.microsoft.com/en-us/azure/virtual-machines/linux/ansible-create-vm
- https://docs.microsoft.com/en-us/azure/virtual-machines/linux/ansible-manage-linux-vm
- https://www.azuredevopslabs.com/labs/vstsextend/ansible/
- https://itrevolution.com/wp-content/uploads/files/PhoenixProjectExcerpt.pdf
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