Deploy SAP HANA on RHEL on AWS

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Solution Architect

Agenda

- AWS Overview
- Red Hat on AWS
- SAP Solutions on AWS
- Deployment of SAP HANA on AWS
- Demo

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AWS Overview

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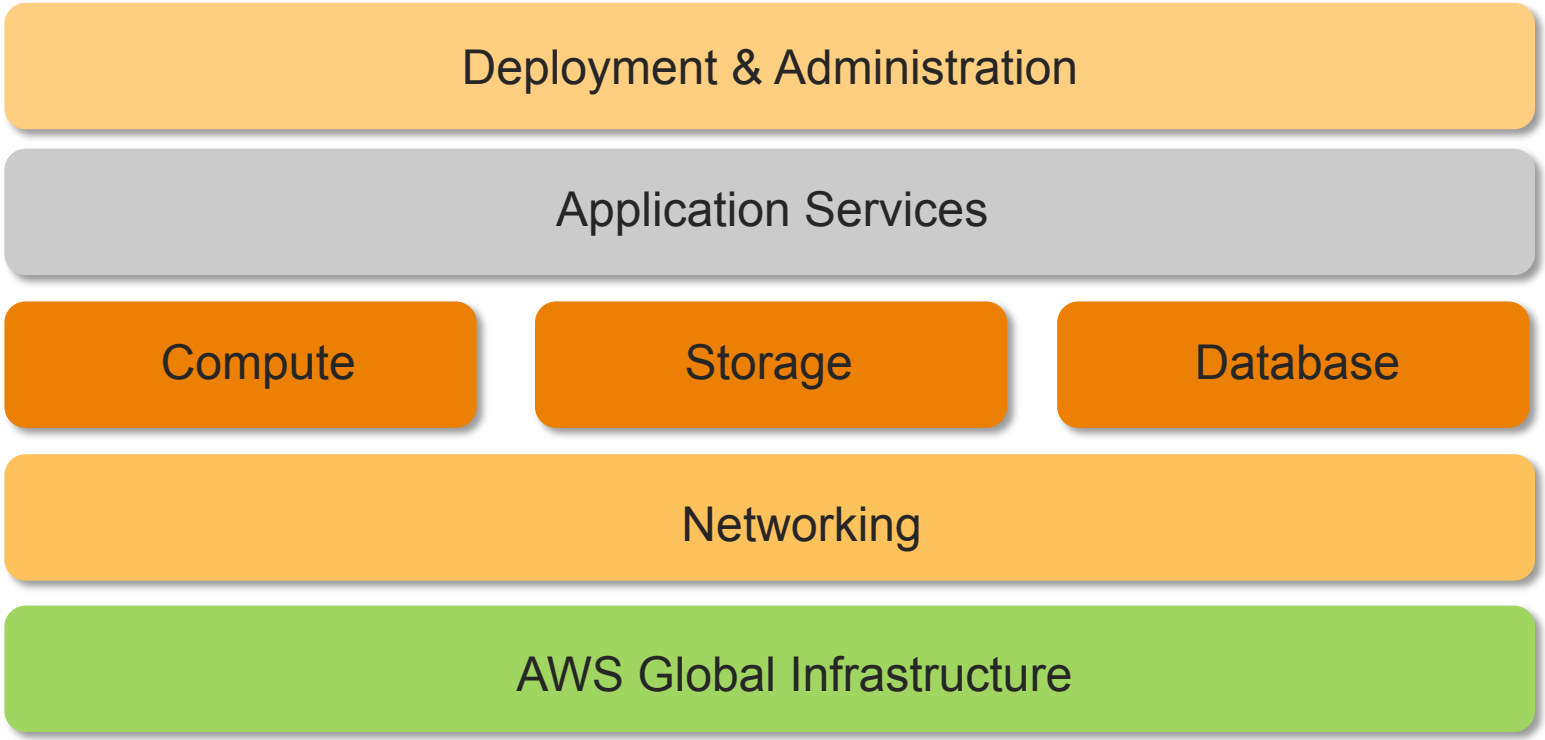
What is Amazon Web Services?



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AWS Global Infrastructure

11 Regions

- N. Virginia
- N. California
- Oregon
- GovCloud US
- Ireland
- Frankfurt
- Singapore
- Tokyo
- Sydney
- Sao Paulo
- China*

28 Availability Zones

53 Edge Locations

http://aws.amazon.com/about-aws/globalinfrastructure

* Limited public release

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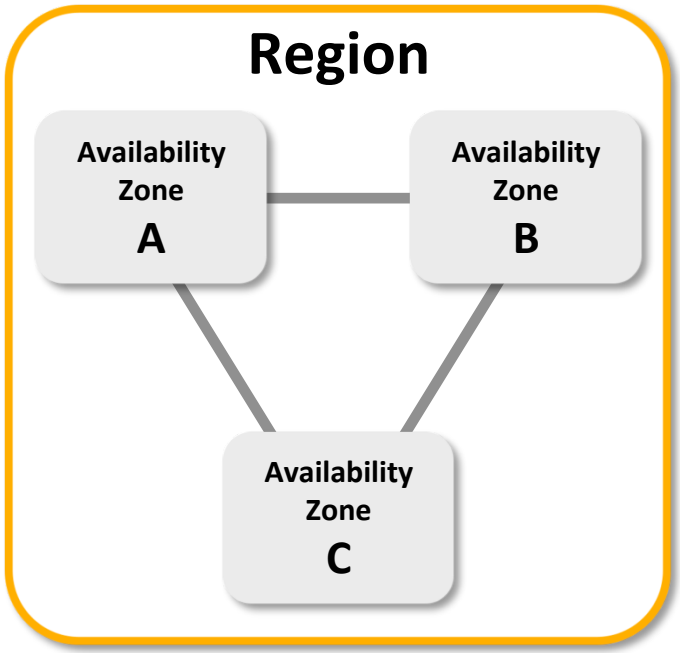
AWS Regions and Availability Zones



Region

- An independent collection of AWS services in a defined geographical location
- Foundation for meeting location dependent privacy and compliance requirements
- Customer has full control - AWS does not move customer's resources
- Contains two or more Availability Zones

Availability Zone

- Distinct locations engineered to be insulated from failures in other Availability Zones
- Connected via an inexpensive, low latency network

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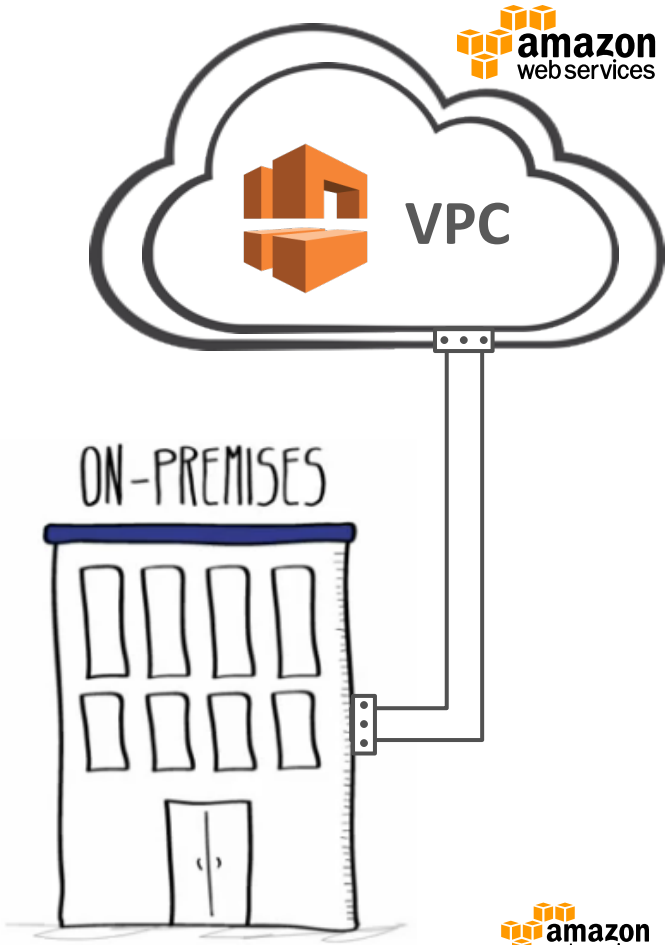
Amazon Virtual Private Cloud (VPC)

A private, isolated section of the AWS cloud where you can launch resources in a virtual network that you define

Enables connectivity between your network and VPC via a VPN or dedicated connection. Simplifies end user access and system integration



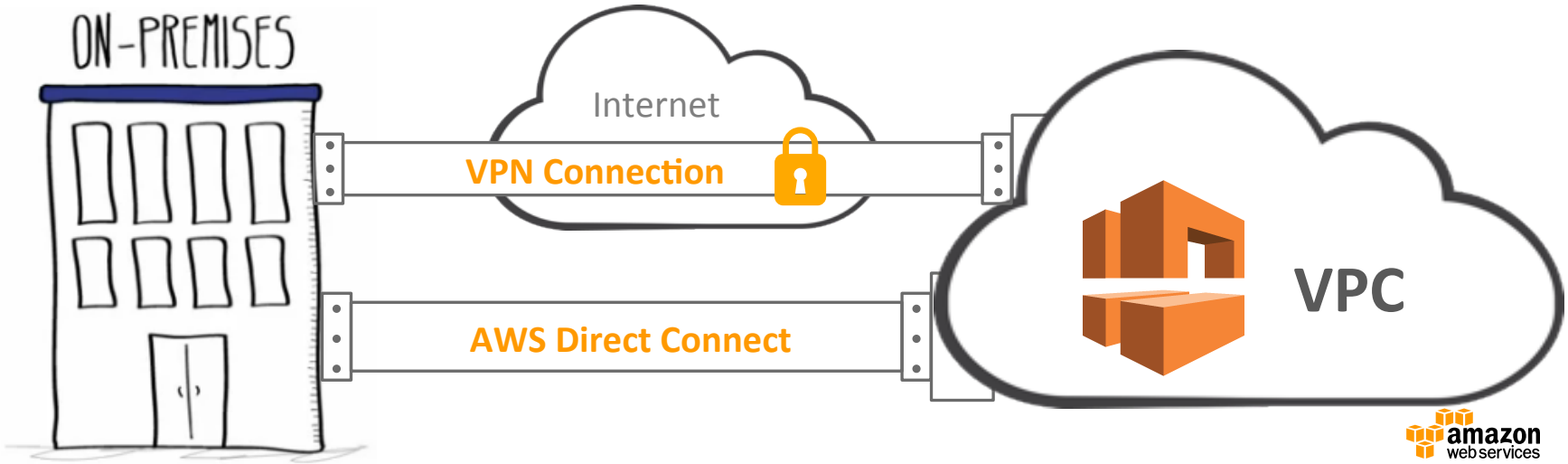
VPC Connectivity Options

VPN Connection

- Encrypted IPsec hardware VPN connection between your network and VPC
- Can create multiple VPN connections to one VPC
- Fast and simple to setup

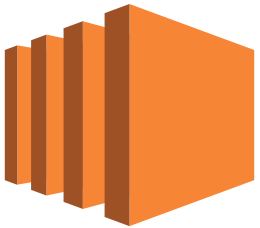
AWS Direct Connect

- Dedicated network connection between your network and VPC
- Can reduce network costs, increase bandwidth throughput, and provide a more consistent network experience
- 1 Gbps or 10 Gbps ports



Amazon Elastic Compute Cloud (EC2)

On-demand virtual computing, storage and networking infrastructure



- Windows and Linux
- 34 different VM sizes available optimized for various workloads
- Self-service provisioning and management
- Monitoring, scaling and load balancing services
- Rapid provisioning from pre-built OS and SAP images
- Pay by the hour - No up-front cost or long-term commitments

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SAP Supported AWS Instances

Compute Optimized				
Name	**vCPU**	**Memory (GiB)**	**I/O Perf**	**SAPS**
c4.8xlarge	36	60	10 Gigabit	37,950
c4.4xlarge	16	30	High	19,030
c4.2xlarge	8	15	High	9,515
c4.xlarge	4	7.5	High	4,758
c4.large	2	3.75	Moderate	2,379
c3.8xlarge	32	60	10 Gigabit	31,830
c3.4xlarge	16	30	High	15,915
c3.2xlarge	8	15	High	7,958
c3.xlarge	4	7.5	High	3,979
c3.large	2	3.75	Moderate	1,989

Memory Optimized				
Name	**vCPU**	**Memory (GiB)**	**I/O Perf**	**SAPS**
r3.8xlarge	32	244	10 Gigabit	31,920
r3.4xlarge	16	122	High	15,960
r3.2xlarge	8	61	High	7,980
r3.xlarge	4	30.5	Moderate	3,990
r3.large	2	15	Moderate	1,995

- ✓ Use in 2-Tier and 3-Tier Configurations
- ✓ Certified Instances for SAP HANA
- ✓ Cluster Networking Available
- ✓ EBS Optimized Instances
- ✓ Enhanced Networking

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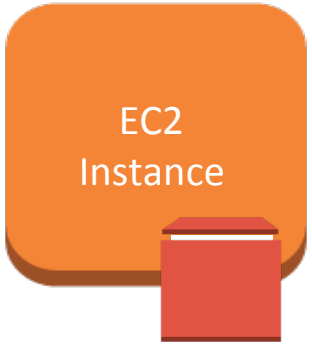
Elastic Block Store (EBS)

- Network attached block device for persistent storage
- Virtual disks
- Custom provision sizes from 1GB to 16TB per volume
- Multiple volumes per EC2 instance
- AES-256 Based encryption available (no extra charge)



EBS Magnetic (Formerly EBS Standard)
Cost effective storage that delivers approximately 40-200 IOPS per volume on average with a best effort ability to burst to hundreds of IOPS p/volume

EBS General Purpose (SSD)
General Purpose (SSD) volumes provide the ability to burst to 3,000 IOPS per volume, independent of volume size. Designed to deliver a consistent baseline of 3 IOPS/GB.

EBS Provisioned IOPS (SSD)
Designed to deliver predictable, high performance for I/O intensive workloads such as databases. Customer specifies an IOPS rate when creating a volume. Currently supports up to 20000 IOPS per volume

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Amazon Simple Storage Service (S3)

Scalable file/object data storage service

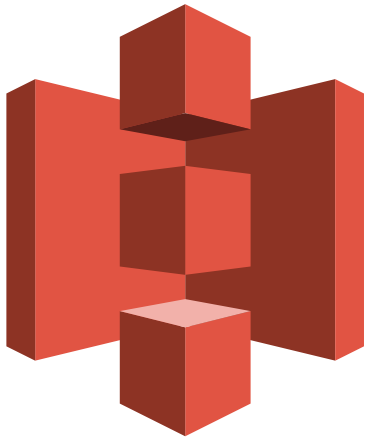
Highly available and durable

Designed to provide…

- 99.99% availability
- 99.99999999% durability

Highly Secure

- Four different access control mechanisms
- Server side encryption available



Amazon S3

SAP Use Cases

- Backup Storage
- SAP Archiving Storage

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AWS CloudFormation

Enables the provisioning and management of a group of integrated AWS resources

Stacks of AWS resources are defined, deployed and managed in a single template file using JSON

SAP Use Cases

- Provision complete SAP landscapes from a single template
- Define and provision entire DR environment from a pre-defined and tested template

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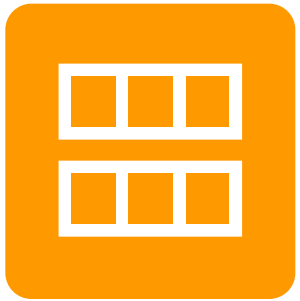
Amazon Machine Image (AMI)



- Software Installations
- Best practices
- Configuration
- …

+

AWS CloudFormation

- Landscape configuration
- Network layout
- Security Policies
- …

=

Significant reduction in time for deployments from weeks to minutes with consistency, repeatability, & reliability

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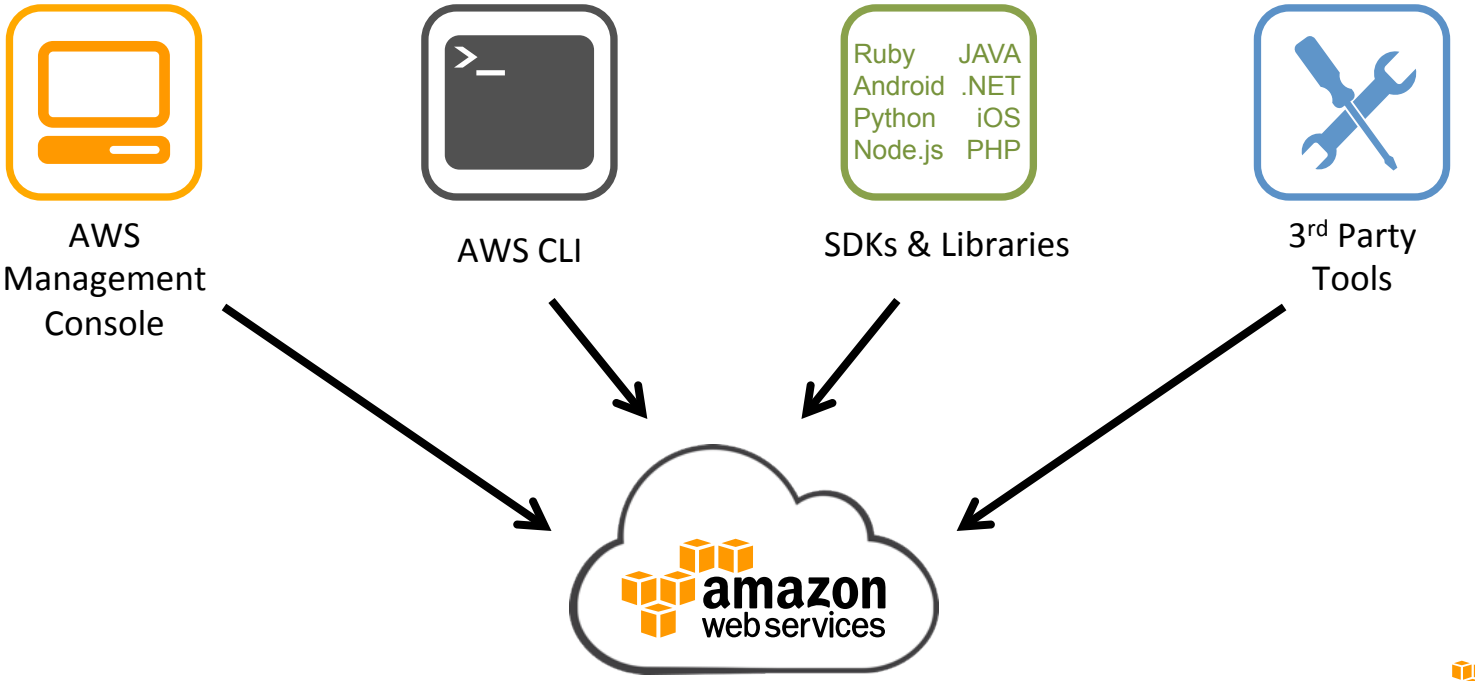
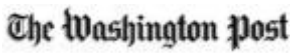
AWS Resource Provisioning and Management

Provisioning and Management of AWS resources is completely self-service using the AWS API



Trusted by Enterprises Around the World



Used by Government Agencies & Educational Institutions Worldwide

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Architected for Enterprise Security Requirements

"The Amazon Virtual Private Cloud [Amazon VPC] was a unique option that offered an additional level of security and an ability to integrate with other aspects of our infrastructure."

Dr. Michael Miller, Head of HPC for R&D

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Red Hat on AWS

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AWS and Red Hat

Amazon Web Services and Red Hat have teamed together to offer Red Hat Enterprise Linux on Amazon EC2.

How are customers using SAP on RHEL on AWS ?

- Migration of existing and implementation of new SAP environments to AWS
- Migration from UNIX to RHEL on AWS
- SAP project, POC, and test systems
- SAP HANA on RHEL for POCs, projects & production

More details available at http://aws.amazon.com/partners/redhat

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How customers can run Red Hat on AWS

- Pay-as-you-go – Provision resources on-demand without long-term commitments or upfront costs.
- Reserved Instances – Lower your cost further by choosing reserved instance with all up-front, partial-upfront or no-upfront payment method.
- Bring your existing subscription – Customers with Red Hat Enterprise Linux Premium subscriptions can use Red Hat Cloud Access to move subscriptions to Amazon EC2

More details available at http://aws.amazon.com/partners/redhat

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Supported Red Hat products on AWS

Product	Versions	Subscription Model
Red Hat Enterprise Linux	5.x, 6.x and 7.x	On-demand, Reserved or Red Hat Cloud Access
Red Hat JBoss Enterprise Application Platform	6.x	Red Hat Cloud Access
Red Hat JBoss Web Server		Red Hat Cloud Access
Red Hat Storage Server		Red Hat Cloud Access

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SAP Solutions on AWS

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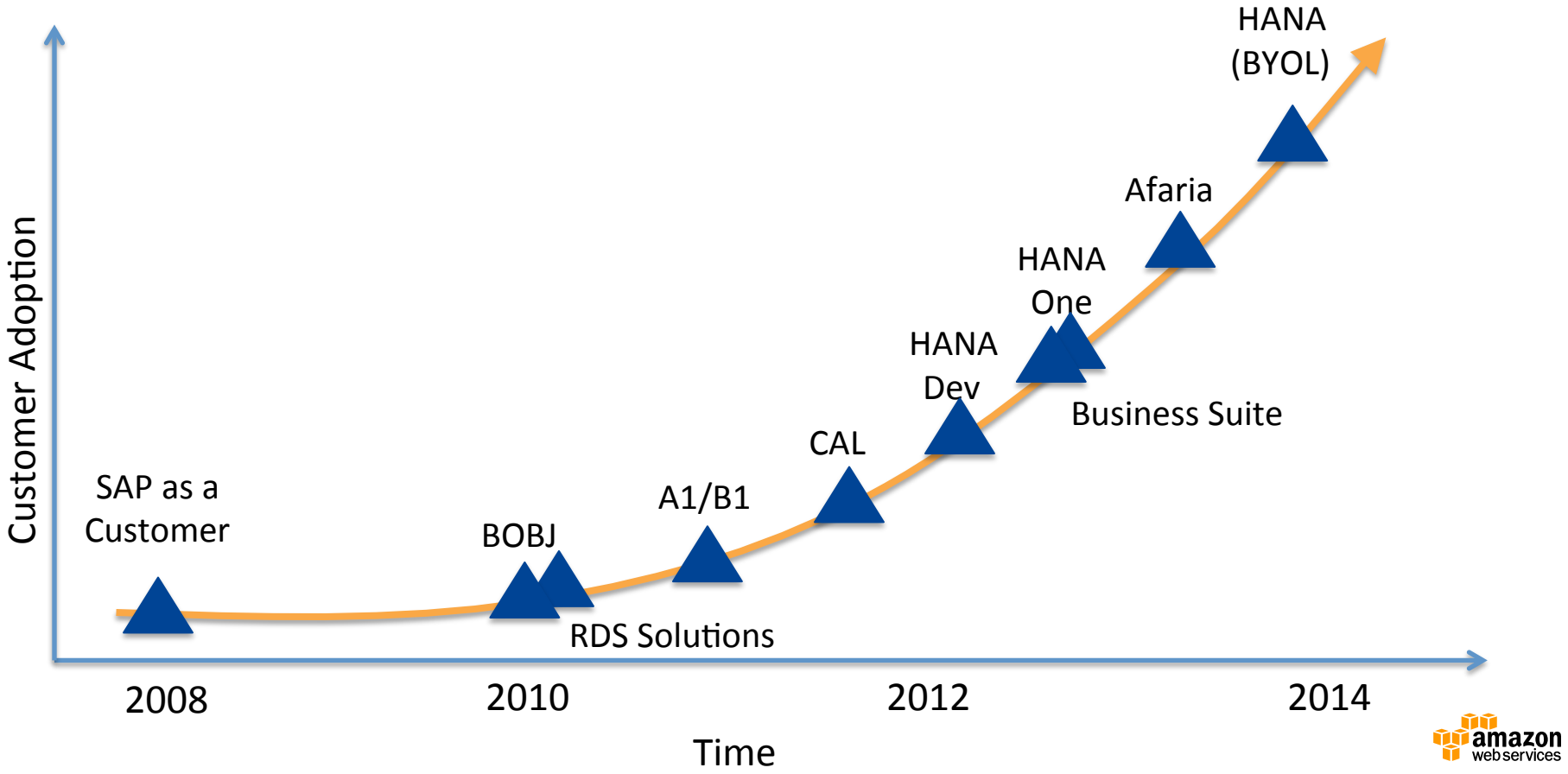
SAP & AWS Relationship - Key Milestones



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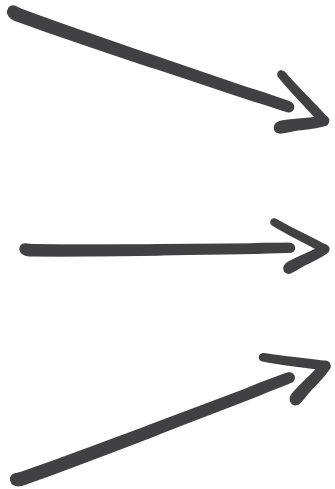
How Customers Use SAP HANA on AWS

1. Production Support Systems (Development & QAS)
2. Non-Production Systems (Training, POC prototypes)
3. Production Systems and Disaster Recovery (DR)



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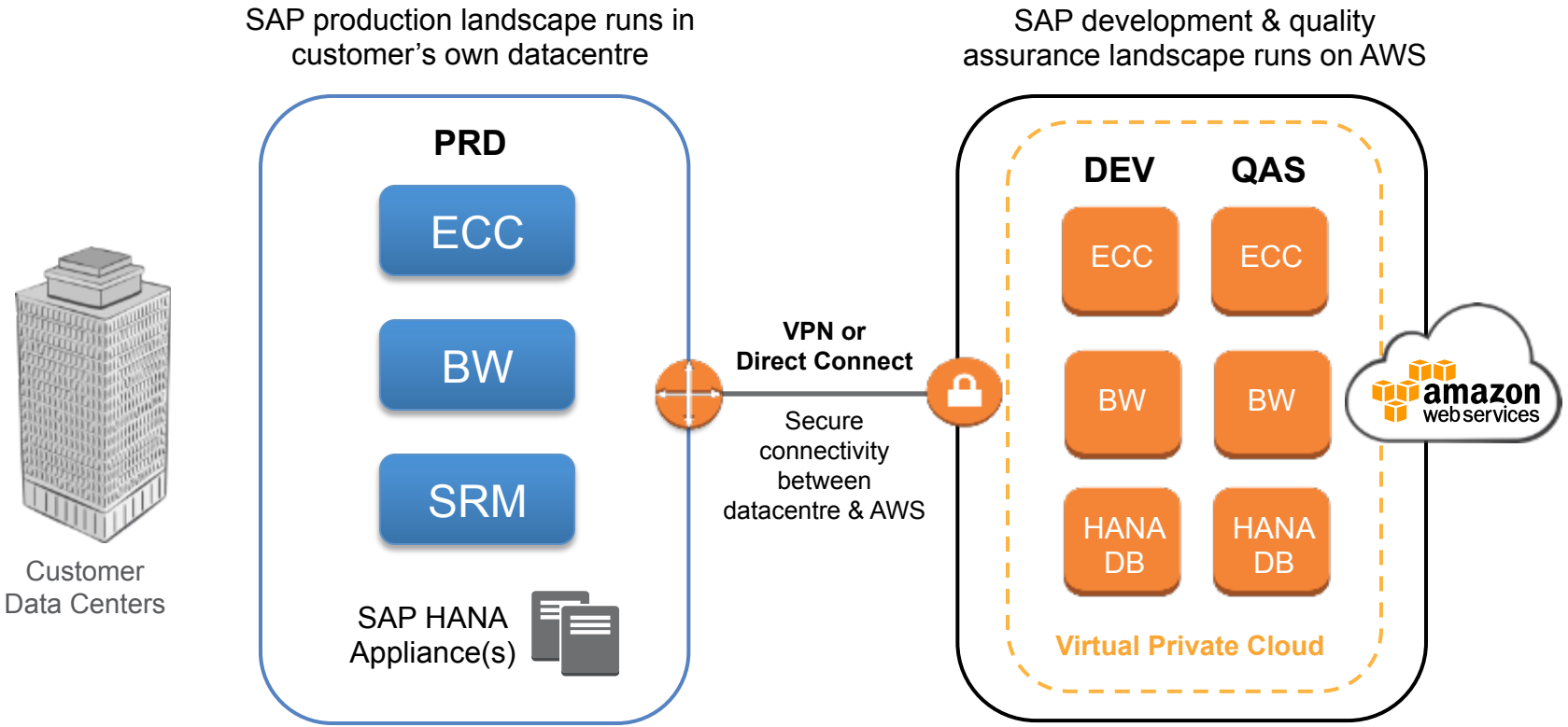
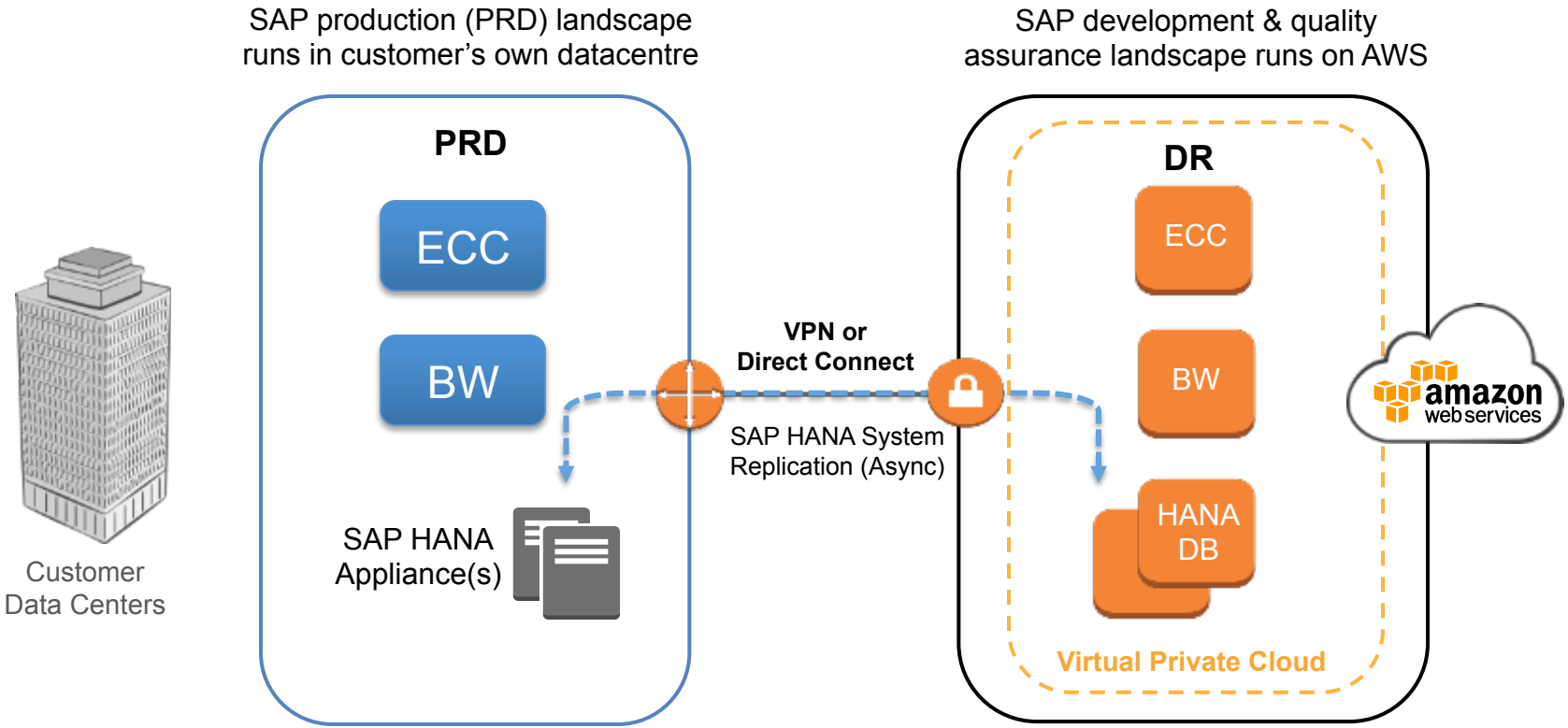
Hybrid HANA Deployment – Customer Data Centre & AWS



SAP HANA Disaster Recovery (DR) on AWS



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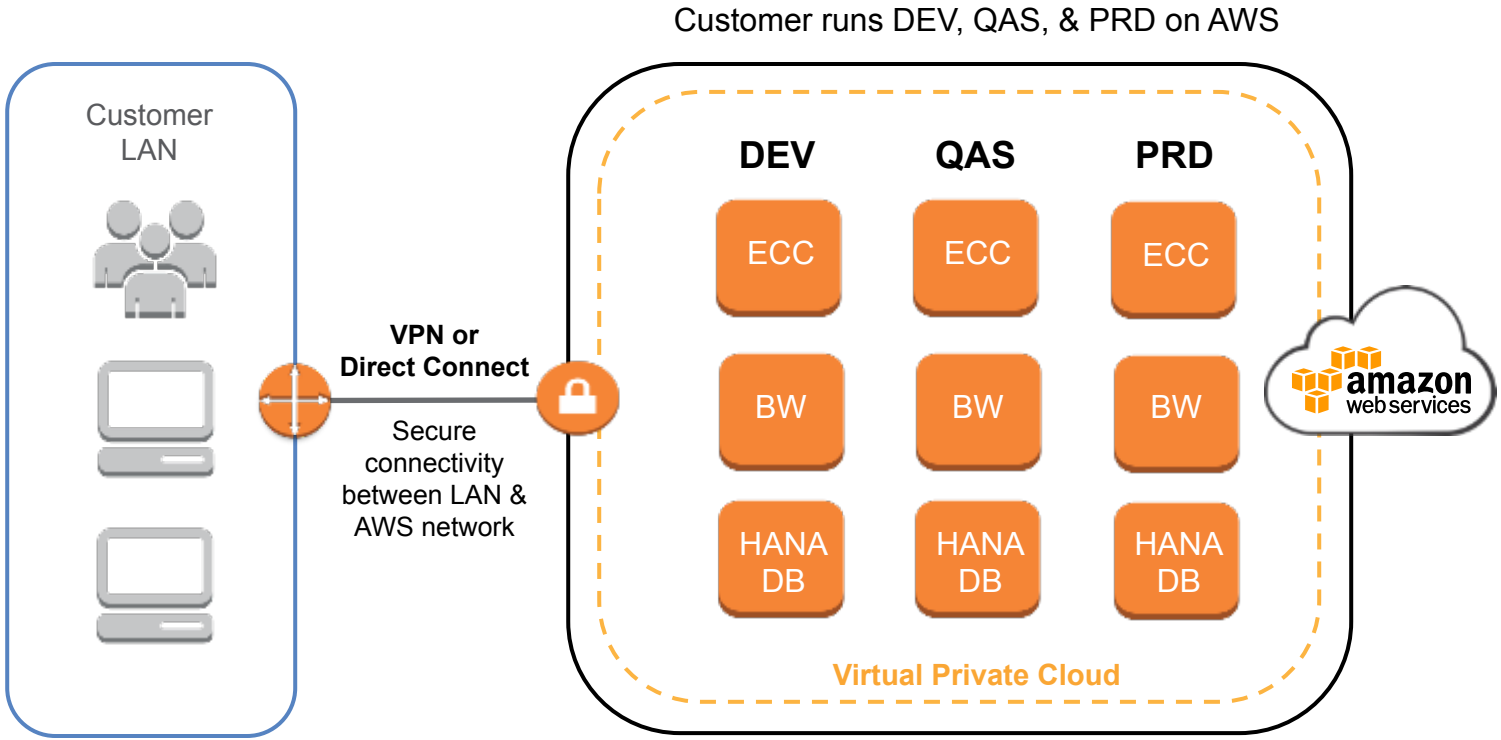
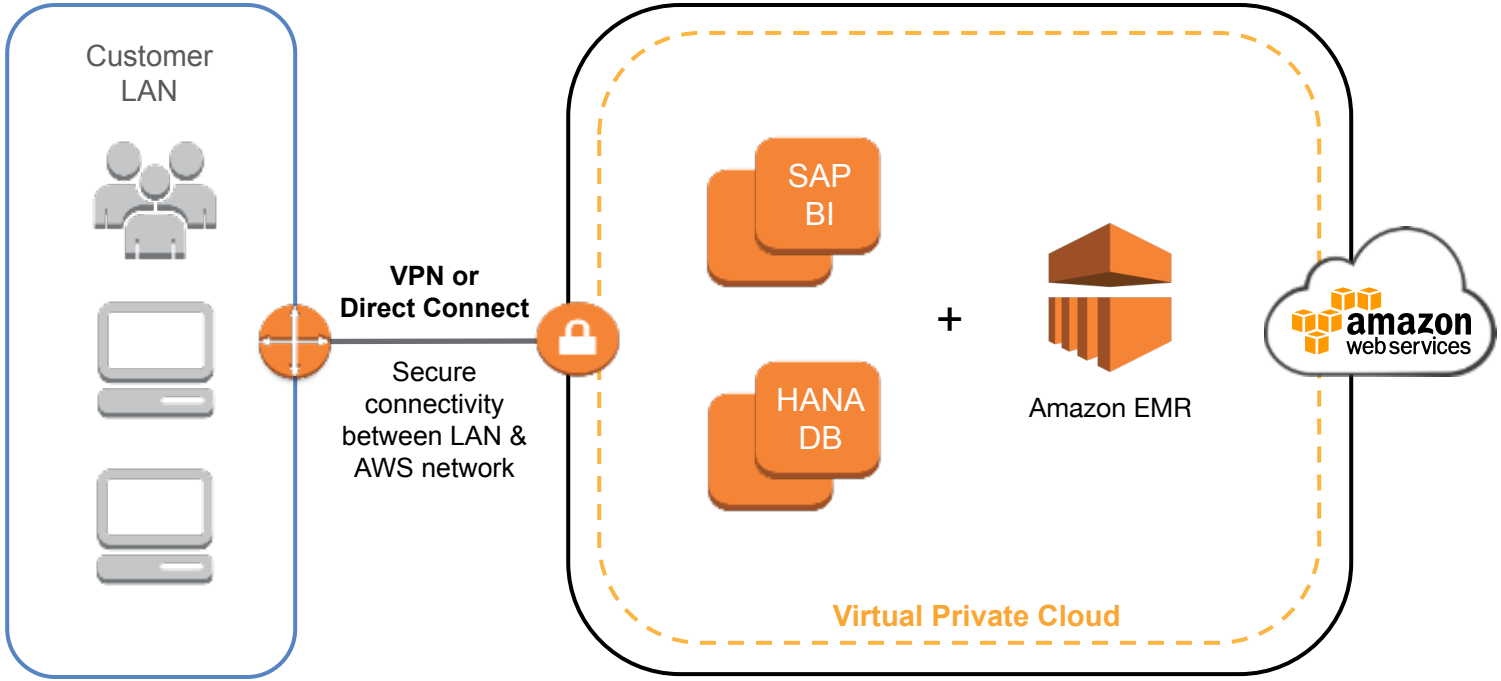
Full SAP HANA Deployment on AWS



SAP HANA for Big Data Analytics



Kellogg Uses AWS to Save $900,000 over 5 Years Over Using On-premises Infrastructure

> Using AWS saves us $900,000 in infrastructure costs alone, and lets us run dozens of simulations a day so we can reduce trade spend. It's a win-win.
>
> **Stover McIlwain**
> Senior Director of IT Infrastructure Engineering
>
> Kellogg's

Kellogg produces breakfast foods for more than 180 companies worldwide, with annual revenue of almost $15 B.

- Needed a better way to track and model promotional costs ("trade spend") to improve the bottom line—and needed to be able to run more than 1 trade-spend simulation/day
- Running SAP Accelerated Trade Promotion Planning (TPM) – Powered by SAP HANA
- By using SAP HANA on AWS, Kellogg estimates it will save $900,000 over 5 years versus traditional on-premises infrastructure alternatives
- Increased business agility: Company can run dozens of trade spend simulations each day, and decreases deployment time by 30x
- Leveraged existing SAP HANA software license investment on AWS
- Familiarity and Accessibility of the AWS platform enabled engineers to easily apply their existing knowledge and infrastructure skills

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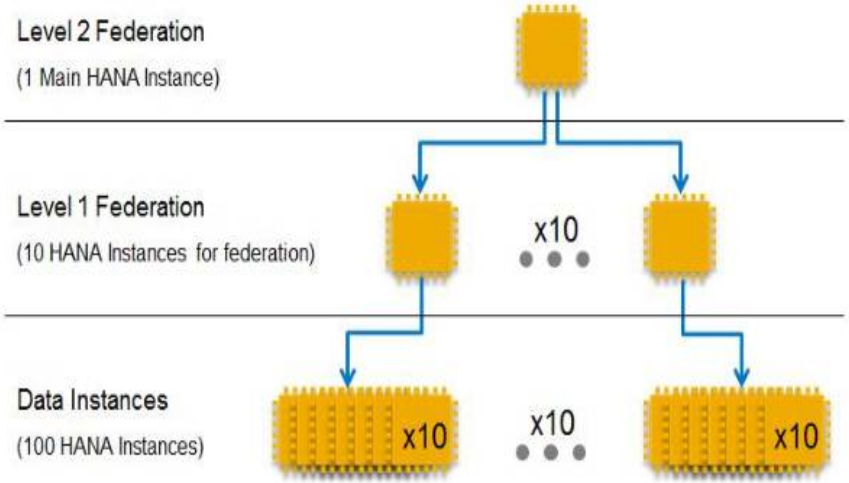
SAP HANA Scalability Test for SAP BW Using In-Memory Data Fabric



- 111 SAP HANA Instances (1,776 CPU Cores)
- 8M Rows loaded per second (60 Billion Total)
- 220ms single node query (600 Million Rows)
- 330ms for federated query (60 Billion rows)
- Throughput of 3 million queries per hour

Additional Details: http://bit.ly/scale-hana-aws

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SAP BW Enhanced Mixed Load (BW-EML) Standard Application Benchmarking on AWS

Date of Certification	Instance Type	Number of Nodes	Total Memory	Number of Records	Adhoc Navigation Steps/hr
01/2014	cr1.8xlarge	1	244 GB	500 Million	113,390
04/2014	r3.8xlarge	1	244 GB	500 Million	137,510
04/2014	r3.8xlarge	5	1.22 TB	2 Billion	177,590
05/2015	r3.8xlarge	14	3.41 TB	5 Billion	258,020
05/2015	r3.8xlarge	17	4.14 TB	5 Billion	303,270

SAP News Center - A 14-node system from Amazon Web Services (AWS) sets the record for SAP HANA scale-out in the cloud, validating it as an ideal solution for customers to cost-effectively consume SAP HANA.

See more at: http://www.news-sap.com/sapphire-now-sap-hana-cloud-platform-digital-economy/

RDBMS: SAP HANA 1.0
Technology platform release: SAP NetWeaver 7.31 / 7.40

Amazon EC2 Cluster Compute Instances for SAP HANA

cr1.8xlarge	r3.8xlarge
2 x Intel Xeon E5-2670 processors (Sandy Bridge)	2 x Intel Xeon E5-2670 v2 processors (Ivy Bridge)
32 vCPUs with hyperthreading	32 vCPUs with hyperthreading
64-bit	64-bit
244 GB RAM	244 GB RAM
10 Gigabit Network	10 Gigabit Network
NUMA and Turbo Support	NUMA and Turbo Support
	Enhanced Networking

SAP HANA Infrastructure Subscription

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Multiple EC2 Pricing Options

Two options most relevant for SAP…

On-Demand

Pay for compute capacity by the hour with no up-front cost or long-tem commitment

Pay for only the hours an instance is online

SAP system types: Test, Demo, Training, POC

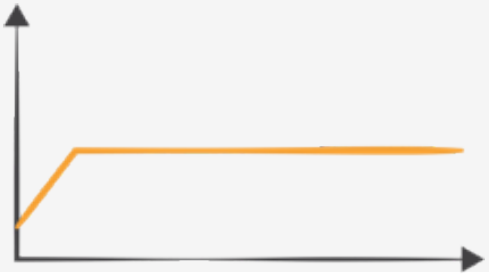
Reserved

Make a low one-time payment and receive a significant discount on the hourly charge

1-year or 3-year term

Three types – Light, Medium and Heavy Utilization

SAP system types: DEV/QAS/PRD



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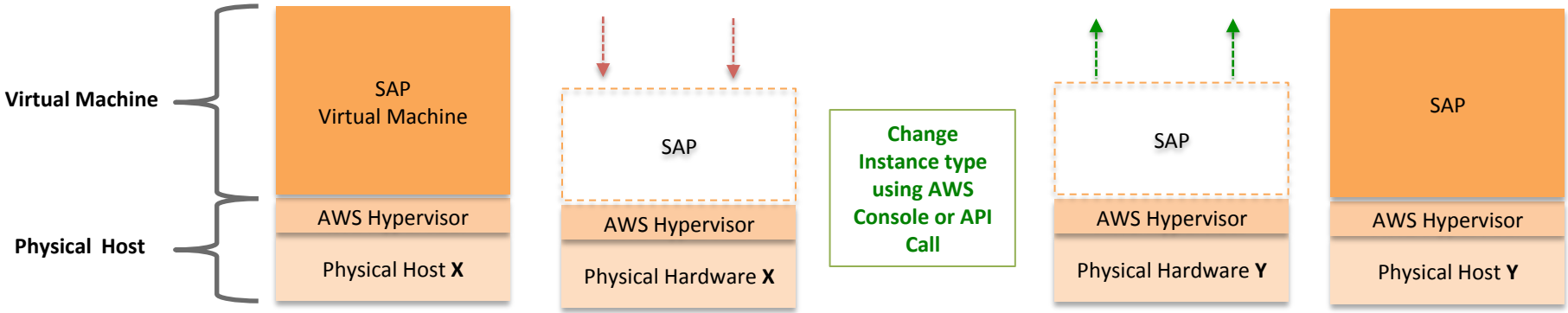
What about Hardware Refreshes?



- Running
- Shutdown
- SAP Virtual Machine is unavailable
- Issue API Call to start Virtual Machine
- SAP Virtual Machine started on a new physical host
- EBS persistent Volumes are mapped by default
- Running (new host)

- Hardware upgrades in minutes!
- No data migration required
- Retain same IP addressing (VPC)

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Deployment of SAP HANA on AWS

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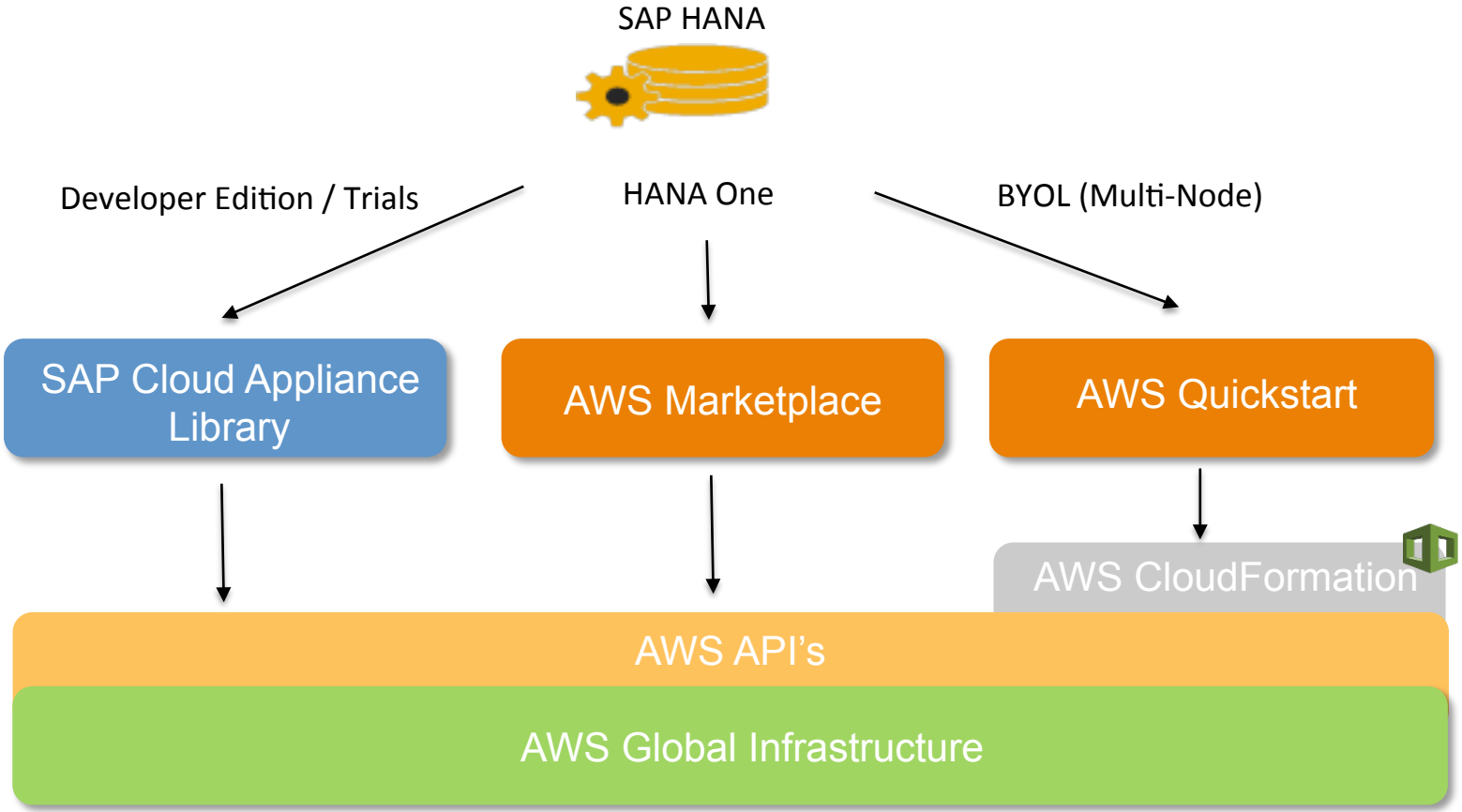
SAP HANA Deployment Methods



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What is AWS Quick Start Reference Deployment ?

- AWS Quick Start reference deployments help you rapidly deploy fully functional enterprise software on the AWS cloud
- Uses AWS CloudFormation templates and custom scripts to automate end to end provisioning
- Quick Starts are modular and customizable; you can layer additional functionality on top or modify them for your own implementations.
- To extend the templates and scripts, visit our GitHub repository.

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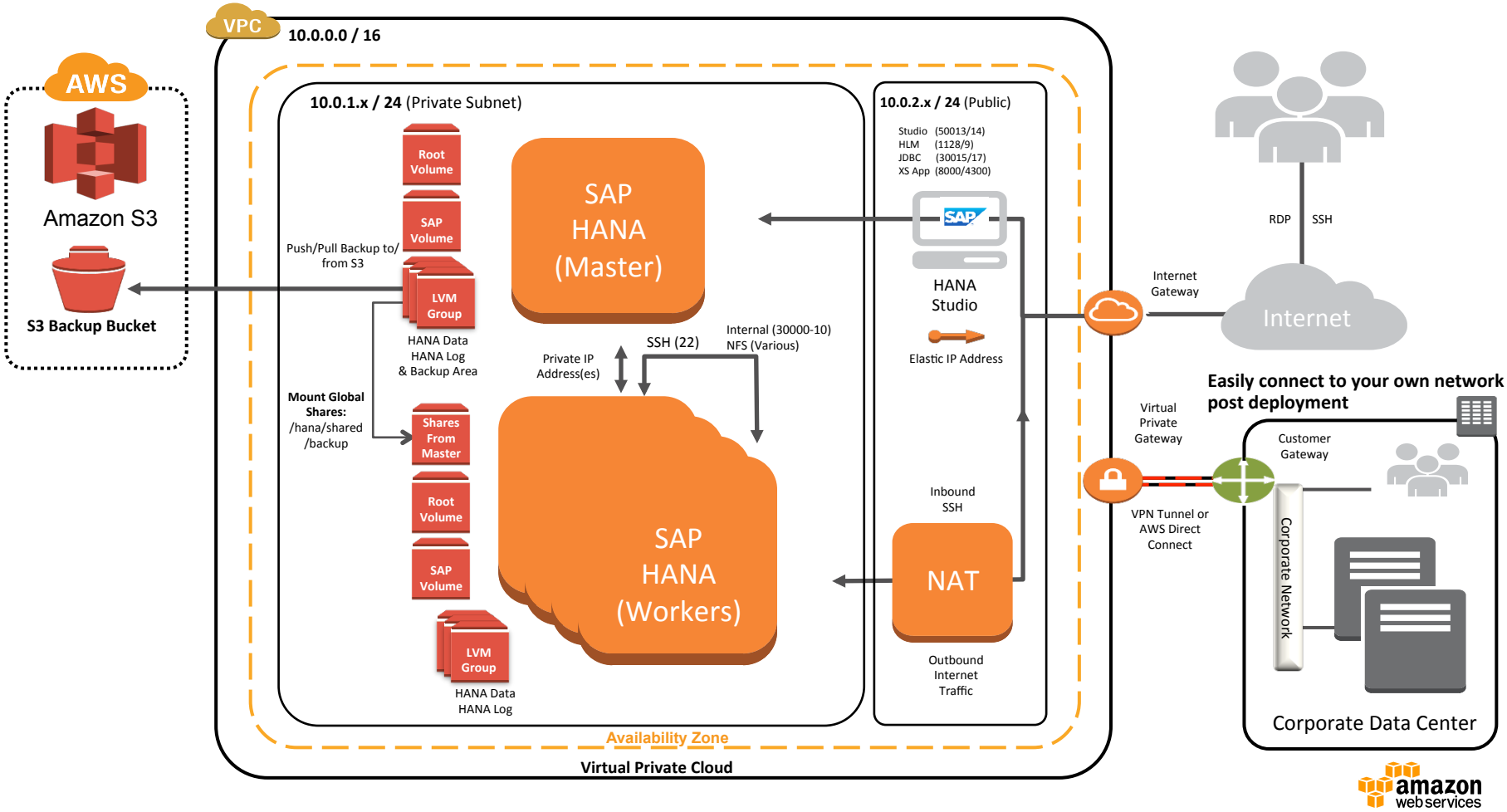
Fully Automated VPC & HANA Deployment in Minutes



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A Quick Start SAP HANA Deployment in 3 simple steps...

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Pre-Requisites: Open an AWS Account

- Sign-up at http://aws.amazon.com
- Decide Amazon EC2 Region where you want to deploy

Region	Location
ap-northeast-1	Asia Pacific (Tokyo)
ap-southeast-1	Asia Pacific (Singapore)
ap-southeast-2	Asia Pacific (Sydney)
eu-central-1	EC (Frankfurt)
eu-west-1	EU (Ireland)
sa-east-1	South America (Sao Paulo)
us-east-1	US East (Northern Virginia)
us-west-1	US West (Northern California)
us-west-2	US West (Oregon)

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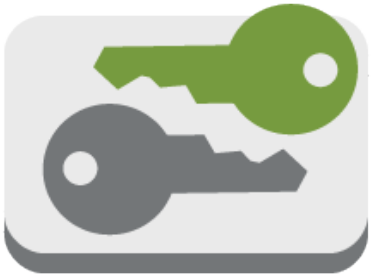
Pre-Requisites: Create or Import a Key-Pair

Amazon EC2 uses public-key cryptography to encrypt and decrypt login information. To be able to log into your instances, you must create a key pair.

Uses:

- Linux: SSH access to virtual machine where SAP HANA is installed
- Windows: Key used to decrypt Windows Administrator Password via the EC2 console. User can then log in using Remote Desktop Protocol (RDP)



Action:

- Create or import a key-pair in your previously selected region in the AWS Console

* For more information go to EC2 User Guide: http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-key-pairs.html

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Pre-Requisites: Sizing for SAP HANA

- **New Implementation:** Use the SAP QuickSizer (*http://service.sap.com/quicksizer*)
- **Migrating an Existing SAP Netweaver BW System:** Use the new ABAP sizing report for SAP NetWeaver BW described in SAP note 1736976*
- **Migrating an Existing SAP Business Suite System to HANA:** See SAP note 1872170* to estimate the main memory requirements of the HANA virtual appliance.

* SAP ID Required

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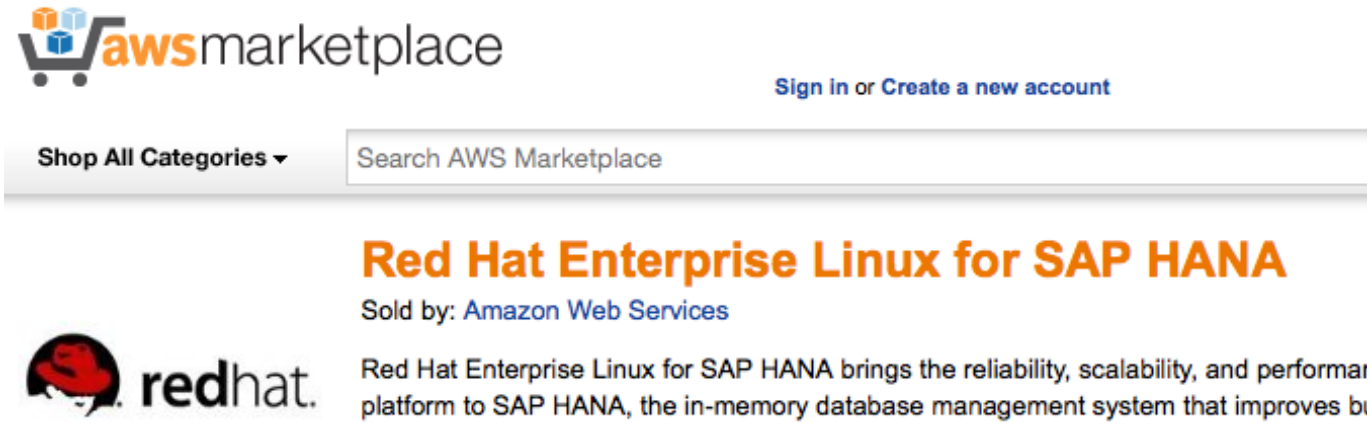
Pre-Requisite: Subscribe for RHEL for SAP HANA AMI

Action: Subscribe for RHEL for SAP HANA AMI from AWS Marketplace

https://aws.amazon.com/marketplace -> Search for RHEL for SAP HANA



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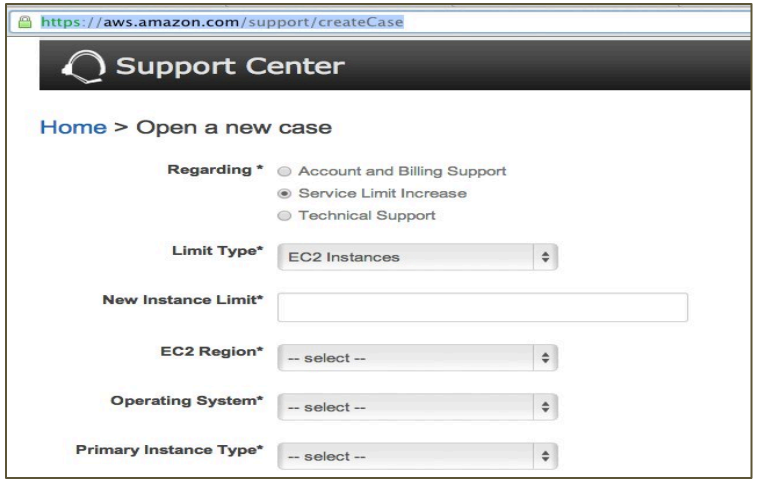
Optional Pre-Requisite: Amazon EC2 Limit Increase

Action: Request a limit increase for Amazon EC2 instances

https://aws.amazon.com/support/createCase -> Service Limit Increase -> Limit Type = EC2



- SAP HANA Deployments leverage the **r3.8xlarge** instance type
- The default limit for r3.8xlarge instances is 5
- If your deployment needs will exceed the default limits please request a limit increase for the instance type in the region of your choice

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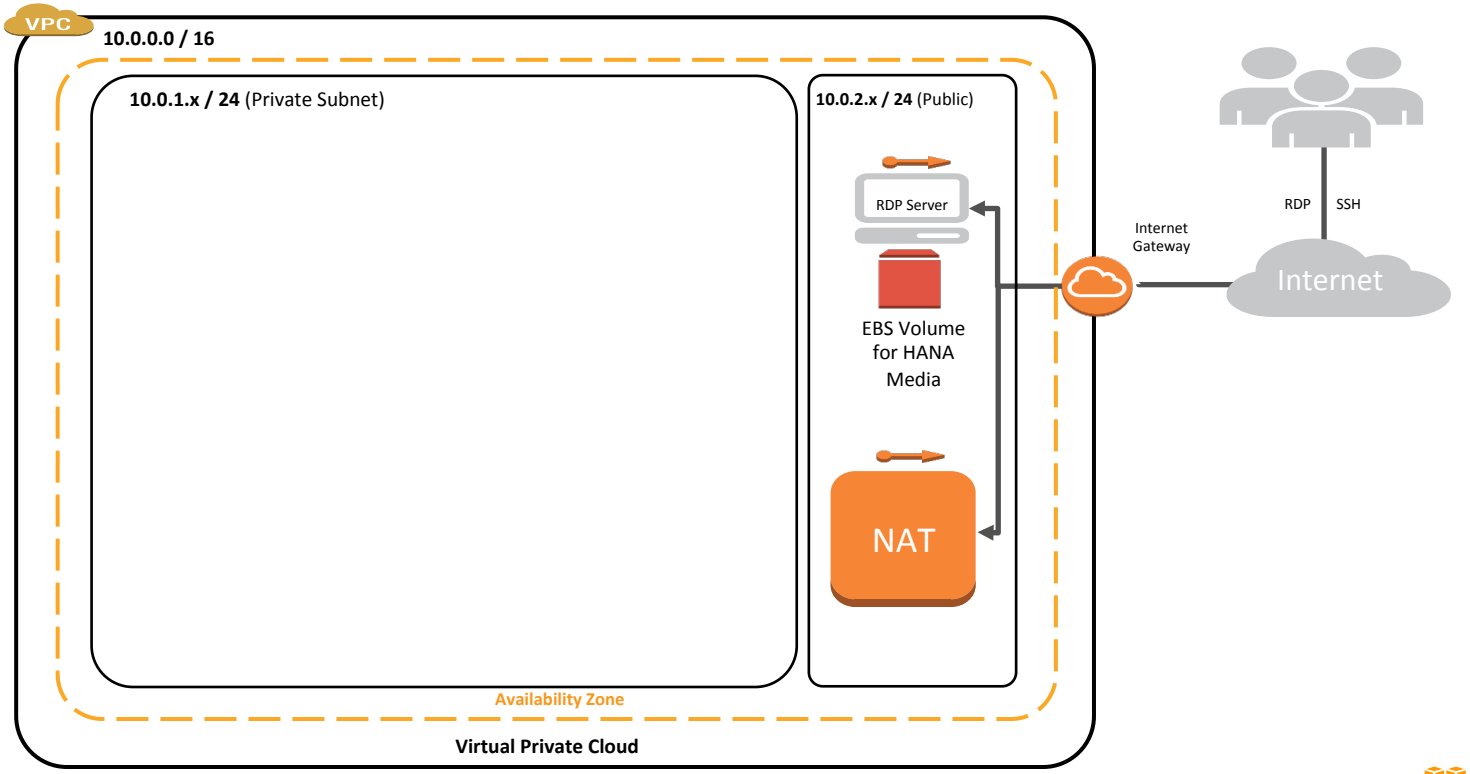
Step 1: Create VPC and Supporting Infrastructure



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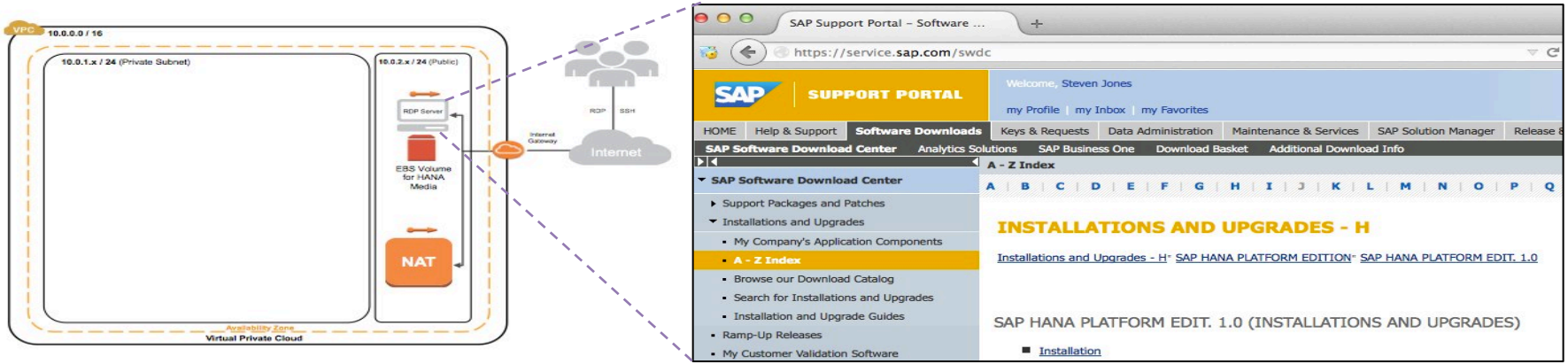
Step 2: Download SAP HANA Software



- Open up RDP session to Windows Server via the Elastic IP Address
  - Decrypt the Windows Administrator Password in the EC2 Console using the Private Key created earlier.
- Download SAP HANA Media from SAP Software Download Center
  http://service.sap.com/swdc (SP8 is supported!)
- Extract SAP HANA Media to D:\ drive

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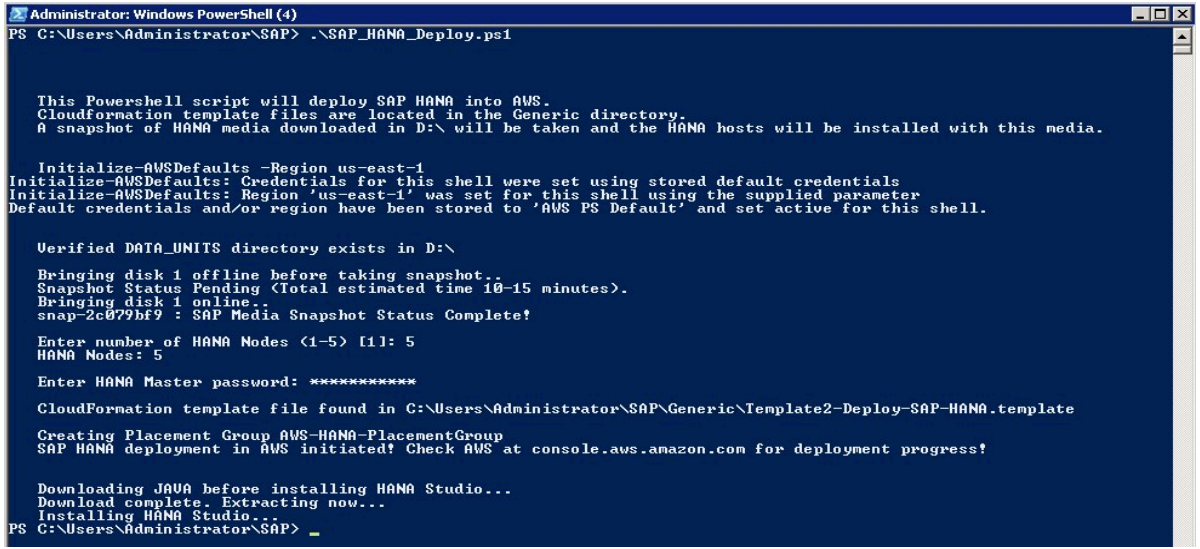
Step 3: Launch Automated Deployment of SAP HANA



- Run .\SAP_HANA_Deploy.ps1 Powershell script
- Wait for snapshot of D:\ drive to complete (10-15 minutes)
- Choose size & number of SAP HANA Nodes to deploy
- Enter a Master Password to be used during the HANA Deployment

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Relax for 30-40 minutes…

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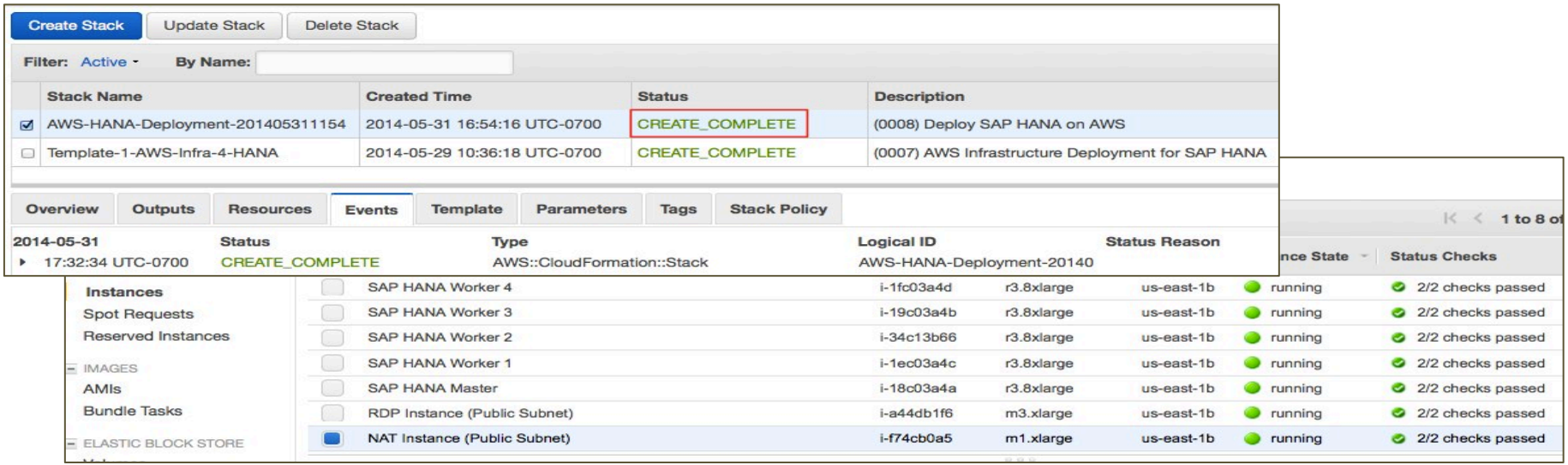
Checking your Deployment



- Monitor console output for CREATE_COMPLETE status
- Verify Status Checks for all created Instances in the Main EC2 Console

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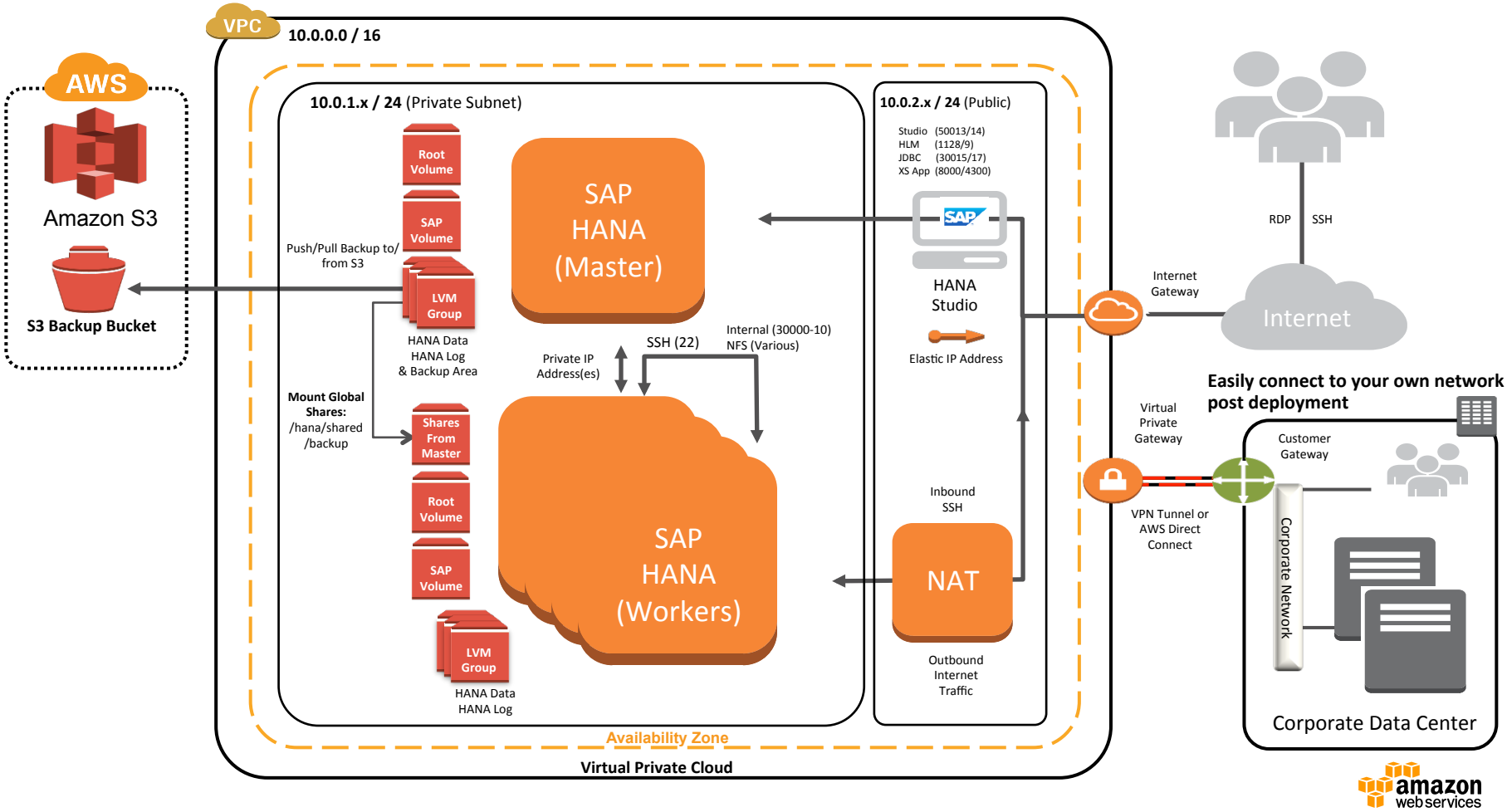
Result: Fully Automated VPC & HANA Deployment in Minutes



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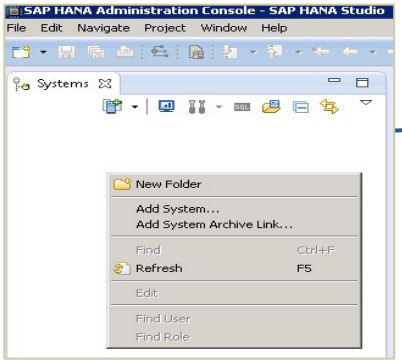
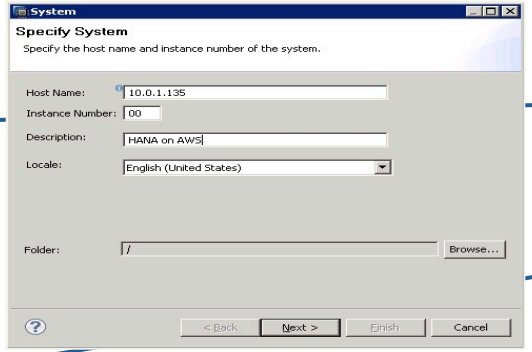
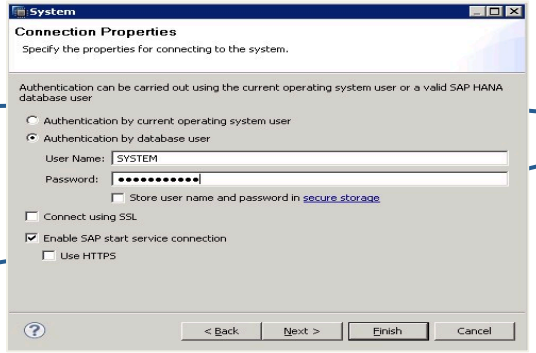
Configure HANA Studio on Windows Server



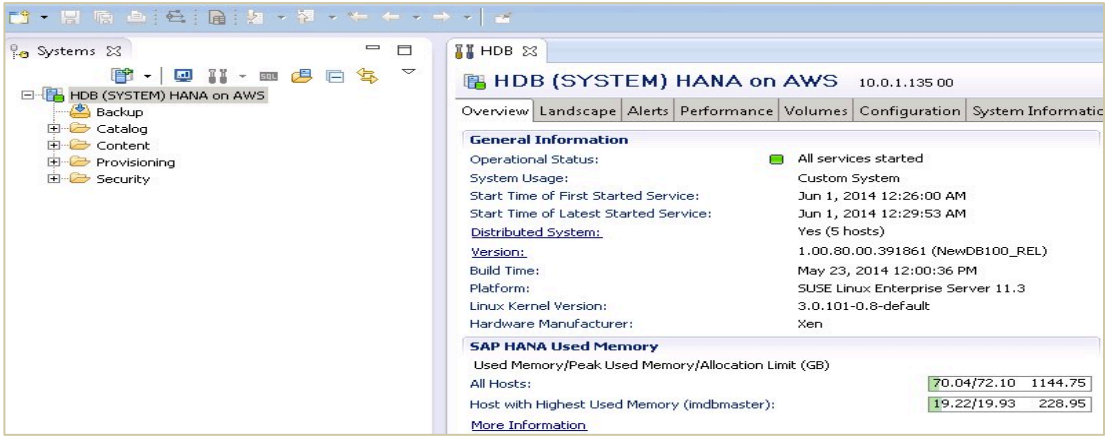
Add System



Enter IP Address of Master Node



User System / Master Password



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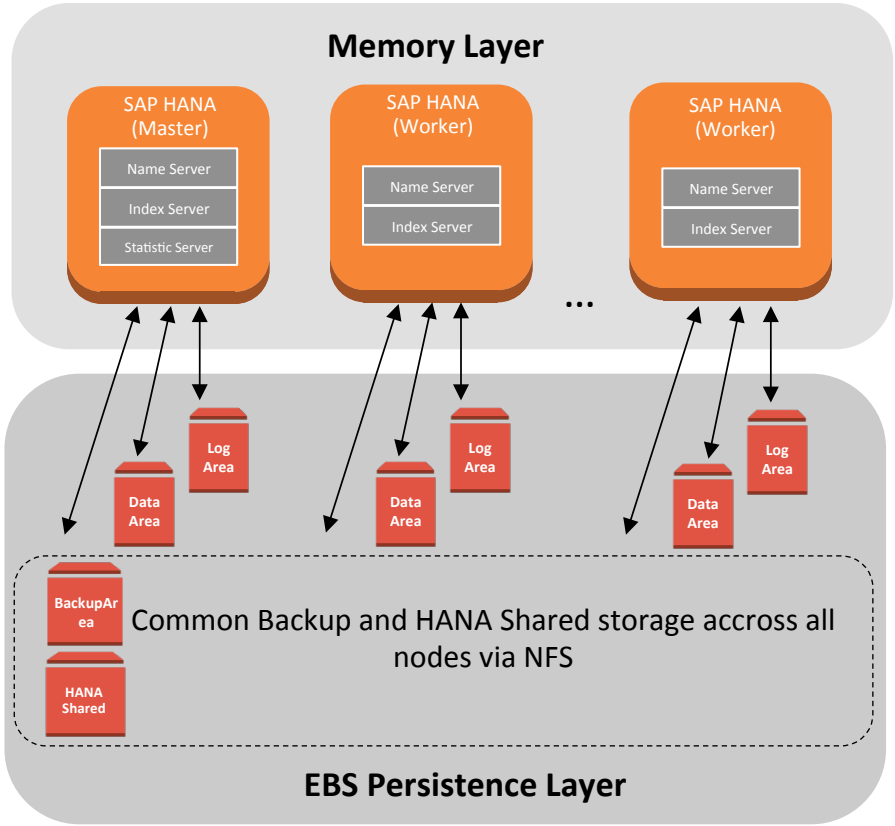
EBS Storage Architecture for HANA



- Production configuration leverages SAP certified EBS for SAP HANA Data, Log, and Backup areas
  - Backed by solid-state drives (SSD)
  - Single-digit millisecond latency
- Each Amazon EBS volume data is replicated across multiple servers in an Availability Zone
- Each SAP HANA node carries the same Amazon EBS configuration regardless of whether it is configured as master or worker node
- Shared nothing storage concept for the SAP HANA data and log areas
- Backup area is shared amongst all members of a cluster

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Live Demo

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Next Steps

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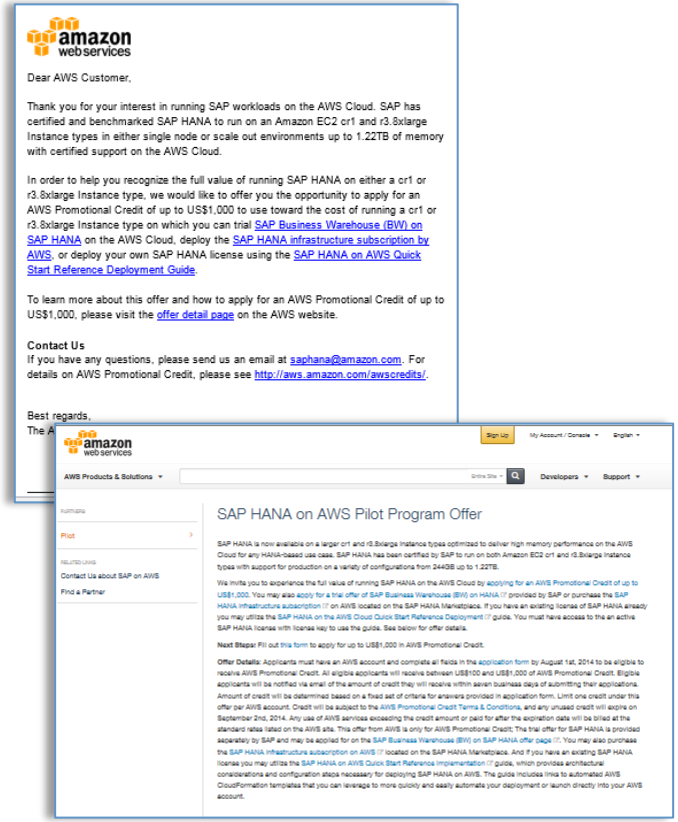
SAP HANA on AWS “Pilot” Program Offer



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Dear AWS Customer,

Thank you for your interest in running SAP workloads on the AWS Cloud. SAP has certified and benchmarked SAP HANA to run on an Amazon EC2 cr1 and r3.8xlarge Instance types in either single node or scale out environments up to 1.22TB of memory with certified support on the AWS Cloud.

In order to help you recognize the full value of running SAP HANA on either a cr1 or r3.8xlarge Instance type, we would like to offer you the opportunity to apply for an AWS Promotional Credit of up to US$1,000 to use toward the cost of running a cr1 or r3.8xlarge Instance type on which you can trial SAP Business Warehouse (BW) on SAP HANA on the AWS Cloud, deploy the SAP HANA infrastructure subscription by AWS, or deploy your own SAP HANA license using the SAP HANA on AWS Quick Start Reference Deployment Guide.

To learn more about this offer and how to apply for an AWS Promotional Credit of up to US$1,000, please visit the offer detail page on the AWS website.

Contact Us
If you have any questions, please send us an email at saphana@amazon.com. For details on AWS Promotional Credit, please see http://aws.amazon.com/awscredits/.

Best regards,

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AWS Products & Solutions | Developers | Support

Pilot

Contact Us about SAP on AWS

Find a Partner

SAP HANA on AWS Pilot Program Offer

- Customers may receive up to US$1,000 in AWS Promotional Credits to evaluate SAP HANA on a much larger instance (Amazon EC2 cr1 or r3.8xlarge Instance type)
- The credit will fund the AWS infrastructure costs for customers to trial SAP HANA through a choice of deployment methods:
  - The SAP Business Warehouse (BW) Trial powered by SAP HANA on AWS or the SAP HANA Infrastructure subscription offering-both offered and available through SAP
  - Or if the customer has their own license of SAP HANA, they may leverage it in a “BYOL” model and use the SAP HANA on AWS Quick Start Reference Deployment Guide as a tool to setup and run it themselves on the AWS Cloud
- Learn more about the Pilot offer, including terms and how to apply for up to US$1,000 in AWS Promotional Credits at http://aws.amazon.com/sap/saphana/pilot/

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Where to Find SAP HANA on AWS Resources

http://aws.amazon.com/sap/saphana/

- Latest updates
- How to Get Started
- Deployment Information
- Support Information
- SAP HANA on AWS Implementation and Operations Guide

Contact us: saphana@amazon.com

SAP HANA in the AWS Cloud Quick Start Deployment Guide

http://aws.amazon.com/quickstart/

Additional SAP on AWS Documentation

http://aws.amazon.com/sap/whitepapers

SAP on AWS Operations Guide

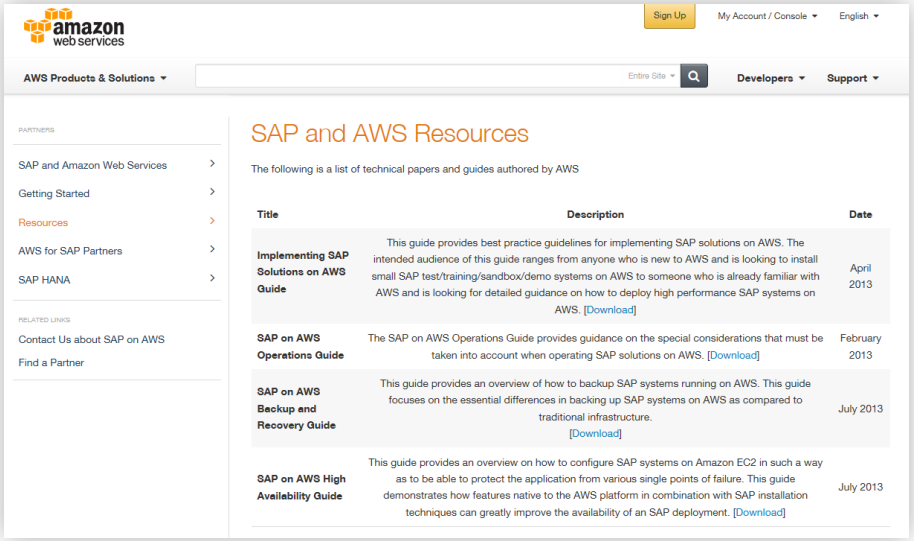
The SAP on AWS Operations Guide discusses the special considerations for operating SAP environments on AWS.

SAP on AWS High Availability Guide

The SAP on AWS High Availability Guide explains how to configure SAP systems on Amazon EC2 to protect the application from various single points of failure.

SAP on AWS Backup and Recovery Guide

The SAP on AWS Backup and Recovery Guide explains how to backup SAP systems running on AWS. The guide contrasts backing up SAP systems on AWS with traditional infrastructure.



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THANK YOU

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