AWS Enterprise Accelerator – Compliance

Standardized Architecture for PCI DSS on the AWS Cloud

Quick Start Reference Deployment

AWS Professional Services
AWS Quick Start Reference Team

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This guide is also available in HTML format at
http://docs.aws.amazon.com/quickstart/latest/accelerator-pci/.

Contents

About This Guide

This Quick Start reference deployment guide discusses architectural considerations and steps for deploying security-focused baseline environments on the Amazon Web Services (AWS) cloud. Specifically, this Quick Start deploys a standardized environment that helps organizations with workloads that fall in scope for Payment Card Industry (PCI) Data Security Standard (DSS) compliance. The template relies on the requirements of PCI DSS version 3.1. The deployment guide includes links for viewing and launching AWS CloudFormation templates that automate the deployment.

This Quick Start is part of a set of AWS Enterprise Accelerator – Compliance offerings, which provide security-focused, standardized architecture solutions to help Managed Service Providers (MSPs), cloud provisioning teams, developers, integrators, and information security teams adhere to strict security, compliance, and risk management controls.

Quick Links

If you have an AWS account that already meets the technical requirements for the PCI deployment, you can launch the Quick Start to build the architecture shown in Figure 2. The template is launched in the US East (N. Virginia) Region by default. If you have an AWS GovCloud (US) account, you can launch the template in the AWS GovCloud (US) Region.

Launch Quick Start

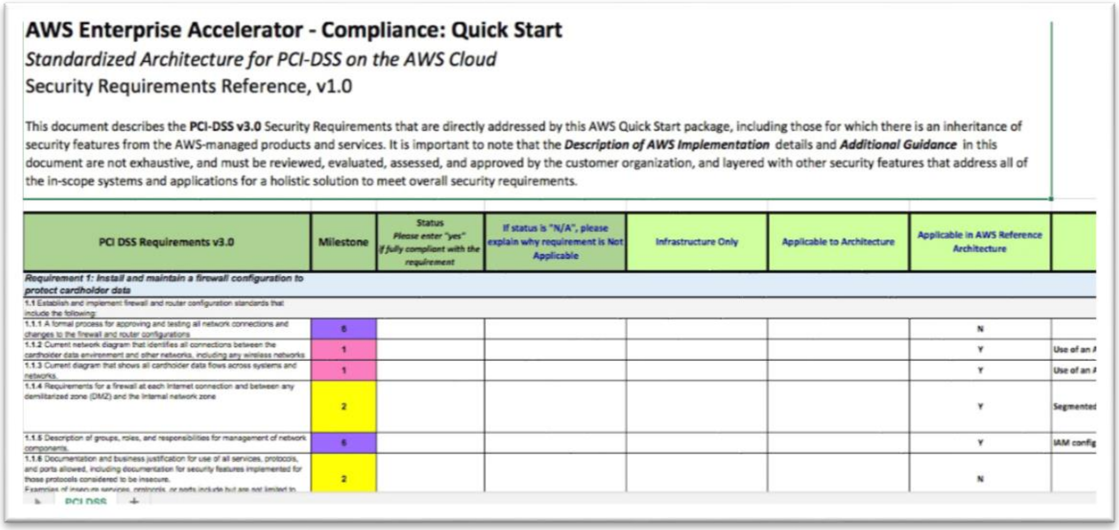
The deployment takes approximately 30 minutes. If you're new to AWS or to PCI-compliant architectures on AWS, please read the overview and follow the detailed pre-deployment and deployment steps described in this guide.

If you want to take a look under the covers, you can view the main template that automates this deployment. The main template includes references to child templates, and provides default settings that you can customize by following the instructions in this guide. For descriptions of the templates and guidance for using the nested templates separately, see the Templates Used in this Quick Start section of this guide.

View main template

To see how PCI DSS controls map to Quick Start architecture decisions, components, and configuration, view the security controls reference (Microsoft Excel spreadsheet). The excerpt in Figure 1 provides a sample of the available information.

View security controls reference



AWS Enterprise Accelerator - Compliance: Quick Start

Standardized Architecture for PCI-DSS on the AWS Cloud

Security Requirements Reference, v1.0

This document describes the **PCI-DSS v3.0** Security Requirements that are directly addressed by this AWS Quick Start package, including those for which there is an inheritance of security features from the AWS-managed products and services. It is important to note that the ***Description of AWS Implementation*** details and ***Additional Guidance*** in this document are not exhaustive, and must be reviewed, evaluated, assessed, and approved by the customer organization, and layered with other security features that address all of the in-scope systems and applications for a holistic solution to meet overall security requirements.

PCI DSS Requirements v3.0	Milestone	Status *Please enter "yes" if fully compliant with the requirement*	If status is "N/A", please explain why requirement is Not Applicable	Infrastructure Only	Applicable to Architecture	Applicable in AWS Reference Architecture	
Requirement 1: Install and maintain a firewall configuration to protect cardholder data							
1.1 Establish and implement firewall and router configuration standards that include the following:							
1.1.1 A formal process for approving and testing all network connections and changes to the firewall and router configurations	6					N	
1.1.2 Current network diagram that identifies all connections between the cardholder data environment and other networks, including any wireless networks	1					Y	Use of an A
1.1.3 Current diagram that shows all cardholder data flows across systems and networks.	1					Y	Use of an A
1.1.4 Requirements for a firewall at each Internet connection and between any demilitarized zone (DMZ) and the internal network zone	2					Y	Segmented
1.1.5 Description of groups, roles, and responsibilities for management of network components.	6					Y	IAM config
1.1.6 Documentation and business justification for use of all services, protocols, and ports allowed, including documentation for security features implemented for those protocols considered to be insecure. Examples of insecure services, protocols, or ports include but are not limited to	2					N	

Figure 1: Excerpt from PCI—DSS security controls reference

We'd like your feedback After you deploy this Quick Start, please take a few minutes to fill out our survey. Your response is anonymous and will help us improve this and other AWS Enterprise Accelerator – Compliance reference deployments.

About Quick Starts

Quick Starts are automated reference deployments for key workloads on the AWS cloud. Each Quick Start launches, configures, and runs the AWS compute, network, storage, and other services required to deploy a specific workload on AWS, using AWS best practices for security and availability.

Overview

AWS Enterprise Accelerator – Compliance Architectures

AWS Enterprise Accelerator – Compliance solutions help streamline, automate, and implement secure baselines in AWS—from initial design to operational security readiness. They incorporate the expertise of AWS solutions architects, security and compliance personnel to help you build a secure and reliable architecture easily through automation.

This Quick Start includes AWS CloudFormation templates, which can be integrated with AWS Service Catalog, to automate building a standardized baseline architecture that follows the requirements for PCI DSS. It also includes a security controls reference, which maps security controls to architecture decisions, features, and configuration of the baseline.

Architecture for PCI DSS on AWS

Deploying this Quick Start builds a multi-tier, Linux-based web application in the AWS cloud. Figures 2 and 3 illustrate the architecture.

Note You can also download these diagrams in Microsoft PowerPoint format, and edit the icons to reflect your specific workload.

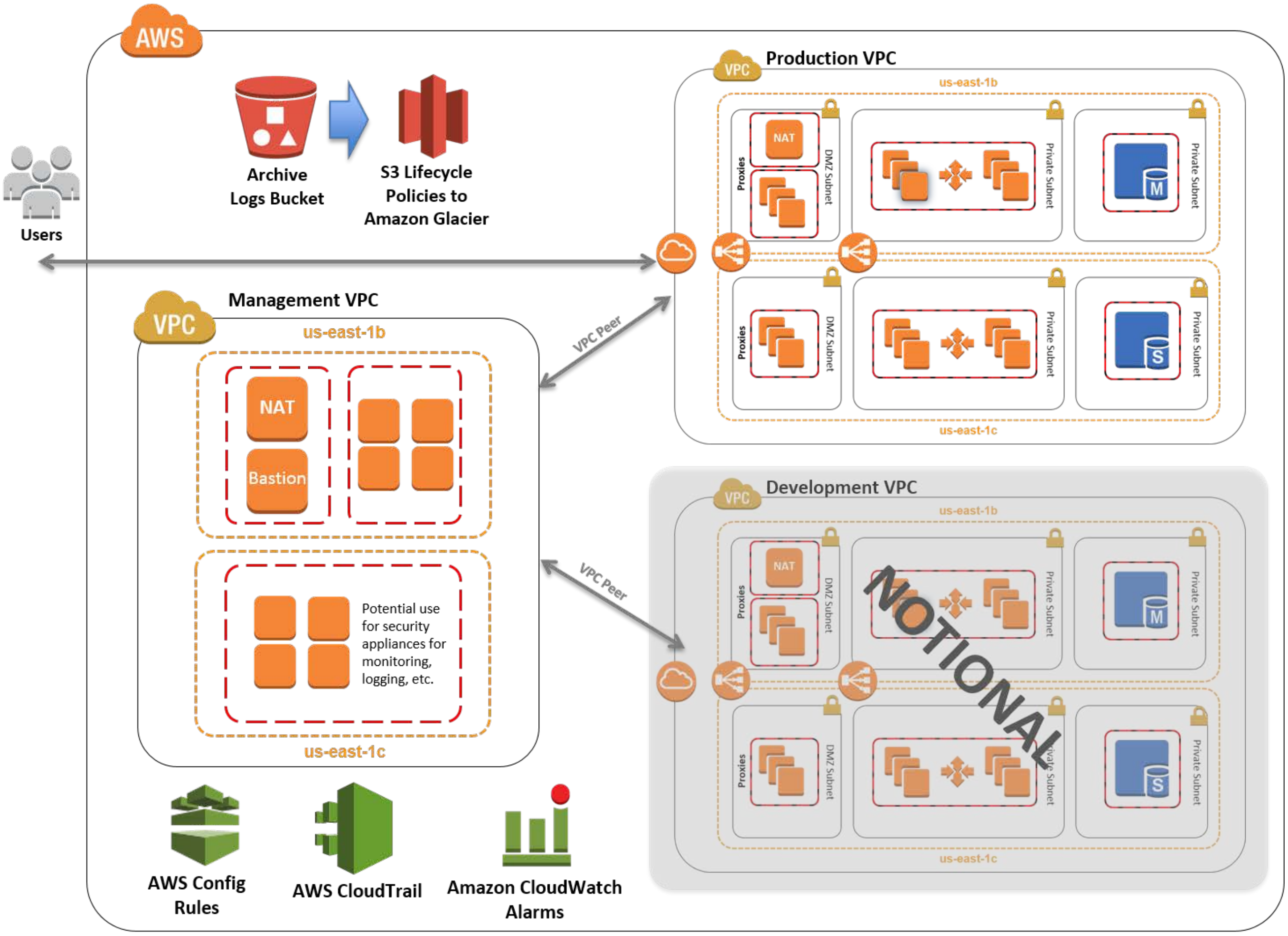


Figure 2: Standard three-tier web architecture for PCI DSS on AWS depicting integration with multiple VPCs (notional development VPC shown)

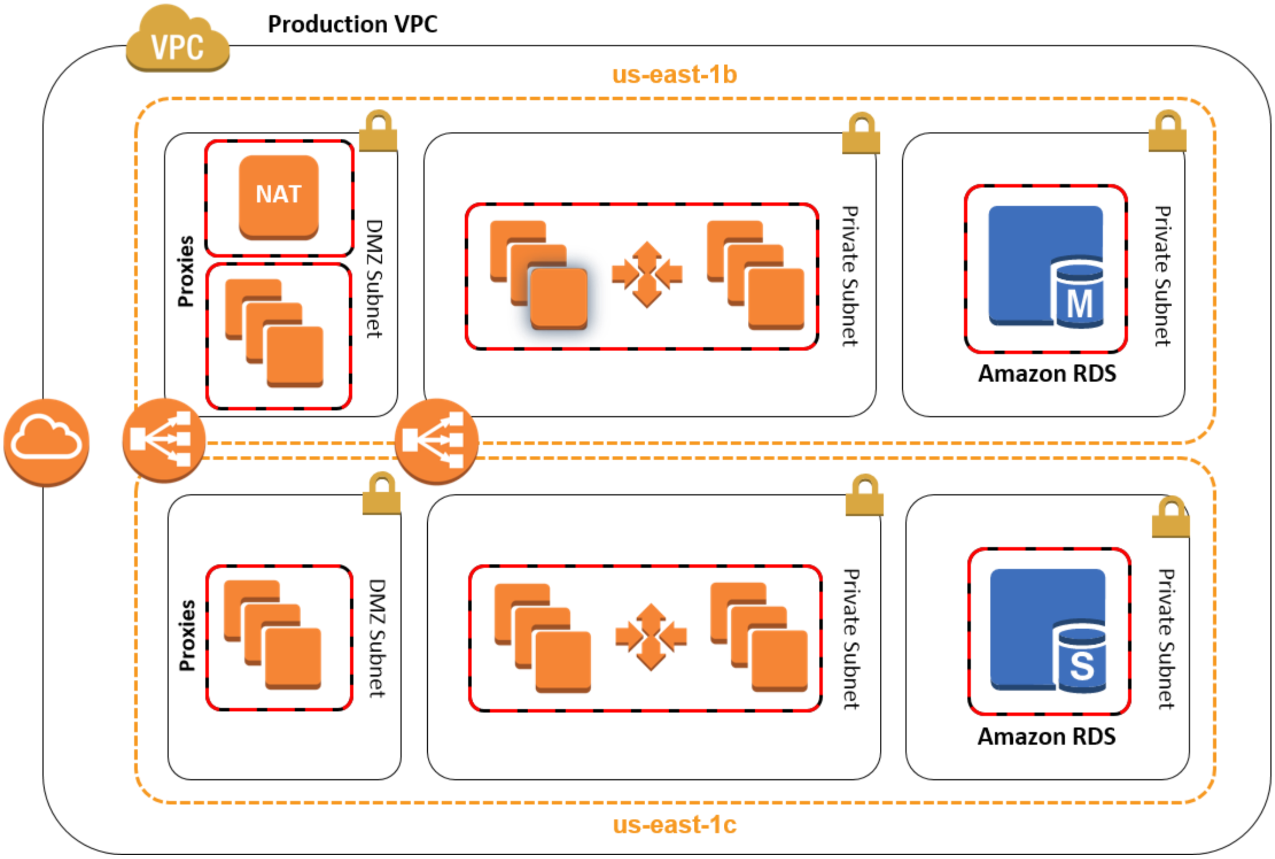


Figure 3: Production VPC design for PCI DSS on AWS

The sample architecture includes the following components and features:

- Basic AWS Identity and Access Management (IAM) configuration with custom IAM policies, with associated groups, roles, and instance profiles
- Standard, external-facing Amazon Virtual Private Cloud (Amazon VPC) Multi-AZ architecture with separate subnets for different application tiers and private (back-end) subnets for application and database
- Amazon Simple Storage Service (Amazon S3) buckets for encrypted web content, logging, and backup data
- Standard Amazon VPC security groups for Amazon Elastic Compute Cloud (Amazon EC2) instances and load balancers used in the sample application stack
- Three-tier Linux web application using Auto Scaling and Elastic Load Balancing, which can be modified and/or bootstrapped with customer application
- A secured bastion login host to facilitate command-line Secure Shell (SSH) access to Amazon EC2 instances for troubleshooting and systems administration activities

- Encrypted, Multi-AZ Amazon Relational Database Service (Amazon RDS) MySQL database
- Logging, monitoring, and alerts using AWS CloudTrail, Amazon CloudWatch, and AWS Config rules

AWS Services

The core AWS components used by this Quick Start include the following AWS services. (If you are new to AWS, see the Getting Started section of the AWS documentation.)

- AWS CloudTrail – AWS CloudTrail records AWS API calls and delivers log files that include caller identity, time, source IP address, request parameters, and response elements. The call history and details provided by CloudTrail enable security analysis, resource change tracking, and compliance auditing.
- Amazon CloudWatch – Amazon CloudWatch is a monitoring service for AWS cloud resources and the applications you run on AWS. You can use Amazon CloudWatch to collect and track metrics, collect and monitor log files, set alarms, and automatically react to changes in your AWS resources.
- AWS Config – AWS Config is a fully managed service that provides you with an AWS resource inventory, configuration history, and configuration change notifications to enable security and governance. AWS Config rules enable you to automatically check the configuration of AWS resources recorded by AWS Config.

> **Note** The AWS Config rules feature is currently available in five AWS Regions: US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), and Asia Pacific (Tokyo).

- Amazon EBS – Amazon Elastic Block Store (Amazon EBS) provides persistent block-level storage volumes for use with Amazon EC2 instances in the AWS cloud. Each Amazon EBS volume is automatically replicated within its Availability Zone to protect you from component failure, offering high availability and durability. Amazon EBS volumes provide the consistent and low-latency performance needed to run your workloads.
- Amazon EC2 – The Amazon Elastic Compute Cloud (Amazon EC2) service enables you to launch virtual machine instances with a variety of operating systems. You can choose from existing Amazon Machine Images (AMIs) or import your own virtual machine images.

- Elastic Load Balancing – Elastic Load Balancing automatically distributes traffic across multiple EC2 instances, to help achieve better fault tolerance and availability.
- Amazon Glacier – Amazon Glacier is a storage service for archiving and long-term backup of infrequently used data. It provides secure, durable, and extremely low-cost storage, supports data transfer over SSL, and automatically encrypts data at rest. With Amazon Glacier, you can store your data for months, years, or even decades at a very low cost.
- Amazon RDS – Amazon Relational Database Service (Amazon RDS) enables you to set up, operate, and scale a relational database in the AWS cloud. It also handles many database management tasks, such as database backups, software patching, automatic failure detection, and recovery, for database products such as MySQL, MariaDB, PostgreSQL, Oracle, Microsoft SQL Server, and Amazon Aurora. This Quick Start includes a MySQL database by default.
- Amazon VPC – The Amazon Virtual Private Cloud (Amazon VPC) service lets you provision a private, logically isolated section of the AWS cloud where you can launch AWS services and other resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own IP address range, creation of subnets, and configuration of route tables and network gateways.

Best Practices

The architecture built by this Quick Start supports AWS best practices for high availability and security:

- Multi-AZ architecture intended for high availability
- Isolation of instances between private/public subnets
- Security groups limiting access to only necessary services
- Network access control list (ACL) rules to filter traffic into subnets as an additional layer of network security
- A secured bastion host instance to facilitate restricted login access for system administrator actions
- Standard IAM policies with associated groups and roles, exercising least privilege
- Monitoring and logging; alerts and notifications for critical events
- S3 buckets (with security features enabled) for logging, archive, and application data
- Implementation of proper load balancing and Auto Scaling capabilities

- HTTPS-enabled Elastic Load Balancing (ELB) load balancers with hardened security policy
- Amazon RDS database backup and encryption

How You Can Use This Quick Start

You can build an environment that serves as an example for learning, as a prototyping environment, or as a baseline for customization.

Since AWS provides a very mature set of configuration options (and new services are being released all the time), this Quick Start provides security templates that you can use for your own environment. These security templates (in the form of AWS CloudFormation templates) provide a comprehensive rule set that can be systematically enforced. You can use these templates as a starting point and customize them to match your specific use cases.

Cost and Licenses

You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start. As of the date of publication, the cost for using the Quick Start with default settings in the US East (N. Virginia) Region is approximately $0.96 per hour. Prices are subject to change. See the pricing pages for each AWS service you will be using for full details.

AWS CloudFormation Templates

An AWS CloudFormation template is a JSON (JavaScript Object Notation)-formatted text file that describes the AWS infrastructure needed to run an application or service along with any interconnections among infrastructure components. You can deploy a template and its associated collection of resources (called a *stack*) by using the AWS Management Console, the AWS Command Line Interface (AWS CLI), or the AWS CloudFormation API. AWS CloudFormation is available at no additional charge, and you pay only for the AWS resources needed to run your applications. Resources can consist of any AWS resource you define within the template. For a complete list of resources that can be defined within an AWS CloudFormation template, see the AWS Resource Types Reference in the AWS documentation.

AWS CloudFormation Stacks

When you use AWS CloudFormation, you manage related resources as a single unit called a stack. In other words, you create, update, and delete a collection of resources by creating, updating, and deleting stacks. All the resources in a stack are defined by the stack's AWS CloudFormation template.

To update resources, you first modify the stack templates and then update the stack by submitting the modified template. You can work with stacks by using the AWS CloudFormation console, AWS CloudFormation API, or AWS CLI.

For more information about AWS CloudFormation and stacks, see Get Started in the AWS CloudFormation documentation.

Templates Used in this Quick Start

This Quick Start uses nested AWS CloudFormation templates to deploy the architecture for a multi-tier, Linux-based web application.

The Quick Start consists of a main template and seven child templates: IAM, logging, production VPC, management VPC, Config rules, NAT instance, and application. These templates are designed to deploy the architecture within stacks that align with AWS best practices and the security compliance framework. The following table describes each template and its dependencies.

Stack and template	Description	Dependencies
Main stack (**template-main.json** — or see GovCloud version)	Primary template file that deploys the rest of the stacks and passes parameters between nested templates automatically.	None
IAM stack (template-iam.json)	Creates a basic IAM configuration with custom policies, groups, and roles.	None
Logging stack (template-logging.json)	Sets up baseline AWS Config rules for monitoring. Enables AWS CloudTrail, S3 buckets, and bucket policies for logging and archive data. Creates standard Amazon CloudWatch alarms for security-related CloudTrail events.	None
Production VPC stack (template-vpc-production.json)	Configures a secure Amazon VPC for a public-facing application that includes subnets, NAT instances or NAT gateways, route tables, and custom network access control list (network ACL) rules.	None

Stack and template	Description	Dependencies
Management VPC stack (template-vpc-management.json)	Configures a secure Amazon VPC for management functions that support the production VPC, and includes subnets, NAT, route tables, custom network access control list (network ACL) rules, and a restricted, public-facing bastion host to support a secured login path for administrator access.	Production VPC stack
Config rules stack (template-config-rules.json)	Sets up baseline AWS Config rules for monitoring.	IAM, Production VPC, and Management VPC stacks
NAT instance stack (template-nat-instance.json)	Conditionally launched by the Management and Production VPC templates to set up EC2 instances for NAT **in AWS Regions where the managed NAT gateway capability is not yet available.**	None
Application stack (template-application.json)	Sets up EC2 instances for reverse proxy and web application, an Amazon RDS database, HTTPS Elastic Load Balancing, Amazon CloudWatch alarms, and Auto Scaling groups.	Production VPC stack

The **template-main.json** template is the entry point for launching the entire architecture, and also allows parameters to be passed into each of the nested stacks. The JSON templates for those nested stacks deploy the resources for the architecture.

To deploy the entire architecture (including IAM and Amazon VPC), use the **template-main.json** template when launching the stacks. To deploy the full package, the IAM user must have permissions to deploy the resources each template creates, which includes IAM configuration for groups and roles.

You can also edit template-main.json to customize stacks or to omit stacks to be deployed. This can be useful for provisioning teams who must deploy the initial base architecture in accounts for application owners. For more information about deployment options and use cases, see Deployment Methods.

Additionally, you can deploy each stack independently. However, this requires that you pass individual parameters to each template upon launch, instead of relying on the main template to pass these values automatically.

Managing the Quick Start Source Files

We've provided a GitHub repository for the tools and templates for this Quick Start so you can modify, extend, and customize them to meet your needs. You can also use your own Git or Apache Subversion source code repository, or use AWS CodeCommit. This is recommended to ensure proper version control, developer collaboration, and documentation of updates.

The GitHub repository for this Quick Start includes the following directories:

docs/	Security controls reference and architecture diagram
templates/	AWS CloudFormation template files for deployment
tools/	Any additional tools and scripts
README.md	Readme file for basic information on this package

Uploading the Templates to Amazon S3

The Quick Start templates are available in an Amazon S3 bucket for Quick Starts. If you're using your own S3 bucket, you can upload the AWS CloudFormation templates by using the AWS Management Console or the AWS CLI, by following these instructions.

Using the Console

1. Sign in to the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. Choose a bucket to store the templates in.
3. Choose **Upload** and specify the local location of the file to upload.
4. Upload all template files to the same S3 bucket.
5. Find the template URLs by selecting each template file, and then choosing **Properties**. Make a note of the URLs.

Using the AWS CLI

1. Download the AWS CLI tool from http://aws.amazon.com/cli/.
2. Use the following AWS CLI command to upload each template file:

```
aws s3 cp <template file>.json s3://<s3bucketname>/
```

Updating the Amazon S3 URLs

The template for the main stack lists the Amazon S3 URLs for the nested stacks. If you upload the templates to your own S3 bucket and would like to deploy the templates from there, you must modify the **vTemplateUrlPrefix** in the `Mappings` section of the **template-main.json** file.

Planning the Deployment

Prerequisites

Specialized Knowledge

This Quick Start requires a moderate to high level of understanding of the process to achieve and manage PCI DSS control requirements and compliance processes within a traditional hosting environment.

Additionally, this solution is targeted at Information Technology (IT) PCI DSS assessors and security personnel, and assumes familiarity with basic security concepts in the area of networking, operating systems, data encryption, operational controls, and cloud computing services.

This deployment guide also requires a moderate level of understanding of AWS services and requires the following, at a minimum:

- Access to a current AWS account with IAM administrator-level permissions
- Basic understanding of AWS services, AWS service limits, and AWS CloudFormation
- Knowledge of architecting applications on AWS
- Understanding of security and compliance requirements in the customer organization

AWS offers training and certification programs to help you develop skills to design, deploy, and operate your infrastructure and applications on the AWS cloud. Whether you are just getting started or looking to deepen your technical expertise, AWS has a variety of resources to meet your needs. For more information, see the AWS Training and Certification website, or read the AWS Training and Certification Overview.

AWS Account

If you don't already have an AWS account, create one at http://aws.amazon.com by following the on-screen instructions. Part of the sign-up process involves receiving a phone call and entering a PIN using the phone keypad.

Technical Requirements

Before you launch the Quick Start, your account must be configured as specified in the following table. Otherwise, deployment might fail. For step-by-step configuration instructions, see the Pre-Deployment Steps section.

<table>
<tr><td>Resources</td><td><table>
<tr><th>Resource</th><th>Default</th><th>Used in this deployment (by default)</th></tr>
<tr><td><b>VPCs</b></td><td>5 per region</td><td><b>2</b></td></tr>
<tr><td><b>EIPs</b></td><td>5 per region</td><td><b>3</b></td></tr>
<tr><td><b>IAM groups</b></td><td>100 per account</td><td><b>6</b></td></tr>
<tr><td><b>IAM roles</b></td><td>250 per account</td><td><b>5</b></td></tr>
<tr><td><b>Amazon EC2 Auto Scaling groups</b></td><td>20 per region</td><td><b>2</b></td></tr>
<tr><td><b>ELB load balancers</b></td><td>20 per region</td><td><b>2</b></td></tr>
</table></td></tr>
<tr><td>Regions</td><td>The AWS services used in this Quick Start exist in all commercial regions, <b>but AWS Config rules,</b> which are used for configuration enforcement, are currently available only in five AWS Regions: <b>US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), and Asia Pacific (Tokyo)</b>. If you require this capability, you must deploy in one of these regions until AWS Config rules become available more widely.
It is important to be aware of what is available in the region you choose to deploy. To see the latest list of supported services per region, see AWS Regions and Endpoints in the AWS documentation. For information about service differences in the AWS GovCloud (US) Region, see Supported Services in the AWS GovCloud documentation.</td></tr>
<tr><td>AWS Config and AWS Config rules</td><td>If you deploy this Quick Start in an AWS region where AWS Config and AWS Config rules are available, the template-config-rules.json template will attempt to automatically use the service. However, <b>the deployment will fail</b> if you have not previously manually set up AWS Config in that region. Before you deploy the Quick Start, navigate to the AWS Config console, and choose the <b>Get Started Now</b> button. Note that this feature is currently available only in five AWS Regions: US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), and Asia Pacific (Tokyo).</td></tr>
<tr><td>Amazon S3 URLs</td><td>If you're copying the templates to your own S3 bucket for deployment, make sure that you update <b>vTemplateUrlPrefix</b> in the <code>Mappings</code> section of the <b>template-main.json</b> file with a valid and accessible URL. <b>Otherwise, deployment will fail</b>.</td></tr>
</table>

IAM permissions	To deploy the Quick Start using the console, you must be logged in to the AWS Management Console with IAM permissions for the resources and actions the templates will deploy. The *AdministratorAccess* managed policy within IAM provides sufficient permissions, although your organization may choose to use a custom policy with more restrictions.
S3 buckets	Unique S3 bucket names are automatically generated based on the account number and region. If you delete a stack, **the logging buckets are not deleted** (to support security review). If you plan to re-deploy this Quick Start in the same region, you must first manually delete the previously created S3 buckets; **otherwise, the re-deployment will fail**.

Deployment Methods

You can deploy the Quick Start templates by using AWS CLI commands or from the AWS Management Console. You can also deploy the template package as an AWS Service Catalog product. AWS Service Catalog enables a self-service model for deploying applications and architecture on AWS. You can create portfolios that include one or more products, which are defined by AWS CloudFormation templates. You can grant IAM users, groups, or roles access to specific portfolios, which they can then launch from a separate interface. We've provided step-by-step instructions for the AWS Management Console deployment option in the following sections.

Pre-Deployment Steps

Before you deploy the PCI DSS Quick Start templates, follow the instructions in this section to confirm that your account is set up correctly:

- Review the service limits and service usage of your AWS account and request increases if required, to ensure that there is available capacity to launch resources in your account.
- Ensure that your AWS account is set up with at least one SSH key pair (but preferably two separate key pairs) **in the AWS Region where you plan to deploy**, for use with the bastion login host and other Amazon EC2 hosts.
- Ensure that you have manually set up AWS Config in the AWS Config console, if you are deploying into an AWS Region where AWS Config is available. AWS Config is currently available in the following regions: US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), and Asia Pacific (Tokyo).

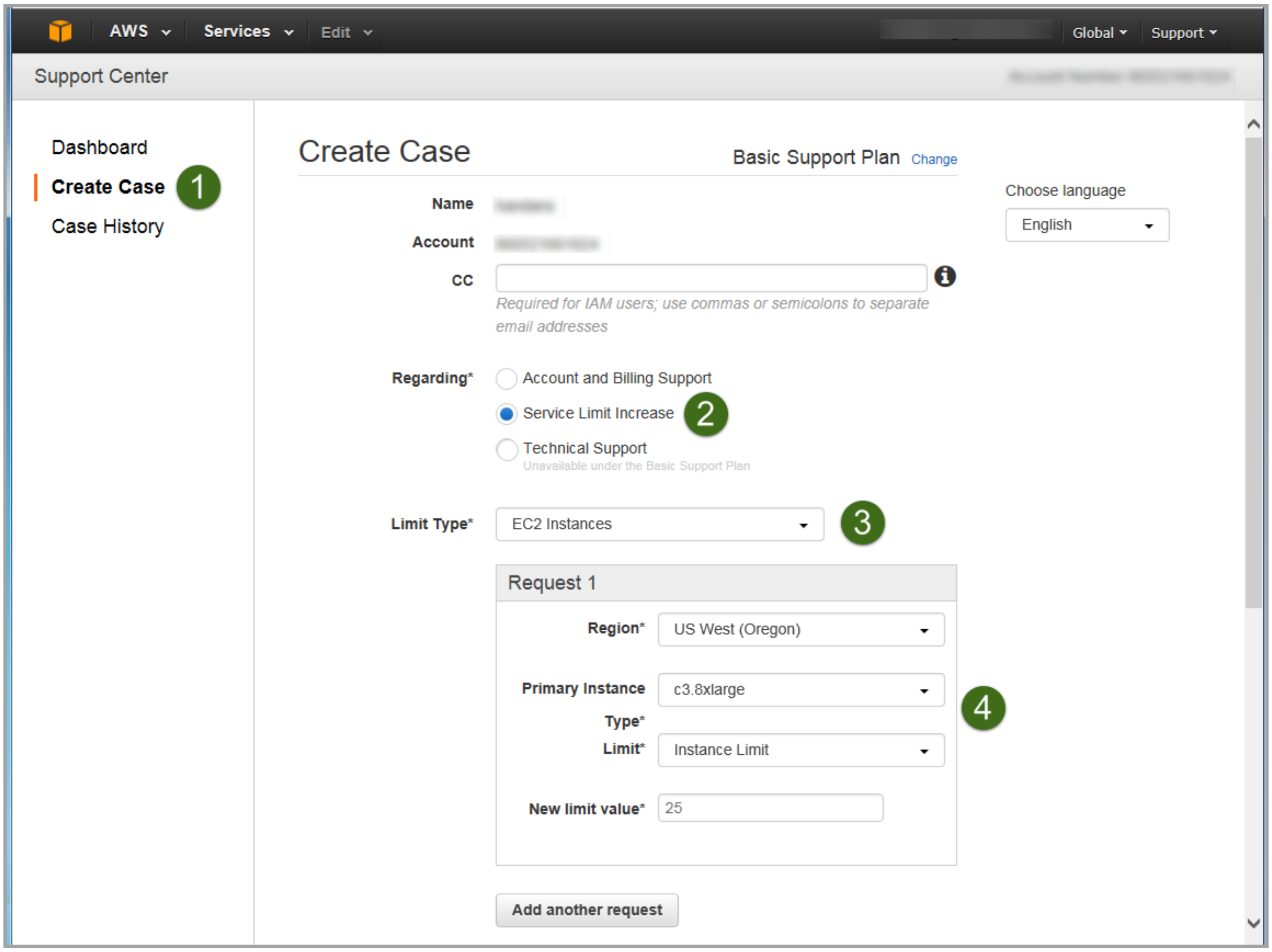
Review AWS Service Limits

To review and (if necessary) increase service limits for the resources you need for the PCI Quick Start deployment, you use the AWS Trusted Advisor console and the Amazon EC2 console. You'll need the resources specified in the Technical Requirements table.

Use Trusted Advisor to view the existing service limits for Amazon VPC, IAM groups, and IAM roles within your account, and ensure that there is availability to deploy additional resources:

1. Open the Trusted Advisor console at https://console.aws.amazon.com/trustedadvisor/.
2. In the navigation pane, choose **Performance**.
3. On the **Performance** page, scroll through the list of performance checks until you find **Service Limits**, and expand that section.
4. Scroll through the service limit names and compare the **Limit Amount** column to the **Current Usage** column, to ensure that you can allocate the following without exceeding the default limit in the AWS Region you will deploy this Quick Start into (US East [N. Virginia] is recommended):
   - Two (2) more VPCs
   - Six (6) more IAM groups
   - Five (5) more IAM roles

   If an increase is needed, you can choose the limit name to open the limit increase request form shown in Figure 4.



Create Case

Basic Support Plan Change

Choose language: English

Name: [redacted]

Account: [redacted]

CC: Required for IAM users; use commas or semicolons to separate email addresses

Regarding*
○ Account and Billing Support
● Service Limit Increase
○ Technical Support
Unavailable under the Basic Support Plan

Limit Type*: EC2 Instances

Request 1

Region*: US West (Oregon)

Primary Instance Type*: c3.8xlarge

Limit*: Instance Limit

New limit value*: 25

Figure 4: Requesting a service limit increase

Now use the Amazon EC2 console to check your limits for Elastic IP addresses, load balancers, and Auto Scaling groups:

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. In the navigation pane, under **Network & Security**, choose **Elastic IPs**.
3. Count the number of allocated Elastic IPs (if any) displayed in the list, and ensure that you can allocate three (3) more without exceeding the default limit of 5 (or the limit increase you previously requested).
4. In the navigation pane, under **Load Balancing**, choose **Load Balancers**.
5. Count the number of existing load balancers (if any) displayed in the list and ensure that you can create two (2) more without exceeding the default limit of 20 (or the limit increase you previously requested).
6. In the navigation pane, under **Auto Scaling**, choose **Auto Scaling Groups**.

7. Count the number of existing Auto Scaling groups (if any) displayed in the list and ensure that you can create two (2) more without exceeding the default limit of 20 (or the limit increase you previously requested).

Create Amazon EC2 Key Pairs

Make sure that at least one Amazon EC2 key pair exists within your AWS account **in the region you are planning to deploy the Quick Start in**.

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Use the region selector in the navigation bar to choose the AWS region where you plan to deploy.
3. In the navigation pane, under **Network & Security**, choose **Key Pairs**.
4. In the key pair list, verify that at least one available key pair (but preferably two available key pairs) exist and make note of the key pair name(s). You'll need to provide a key pair name for the parameters **pEC2KeyPairBastion** (for bastion host login access) and **pEC2KeyPair** (for all other Amazon EC2 host login access) when you launch the Quick Start. Although you can use the same key pair for both parameters, we recommend that you use a different key pair for each.

   If you want to create a new key pair, choose **Create Key Pair**. For additional information, see the Amazon EC2 documentation.

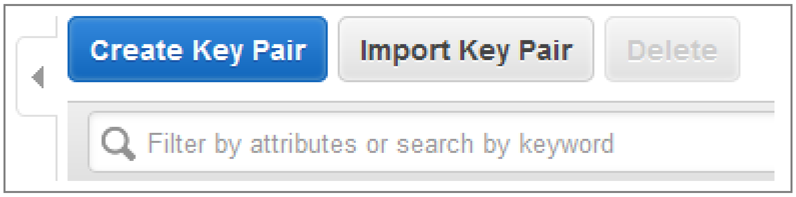


Figure 5: Creating a key pair

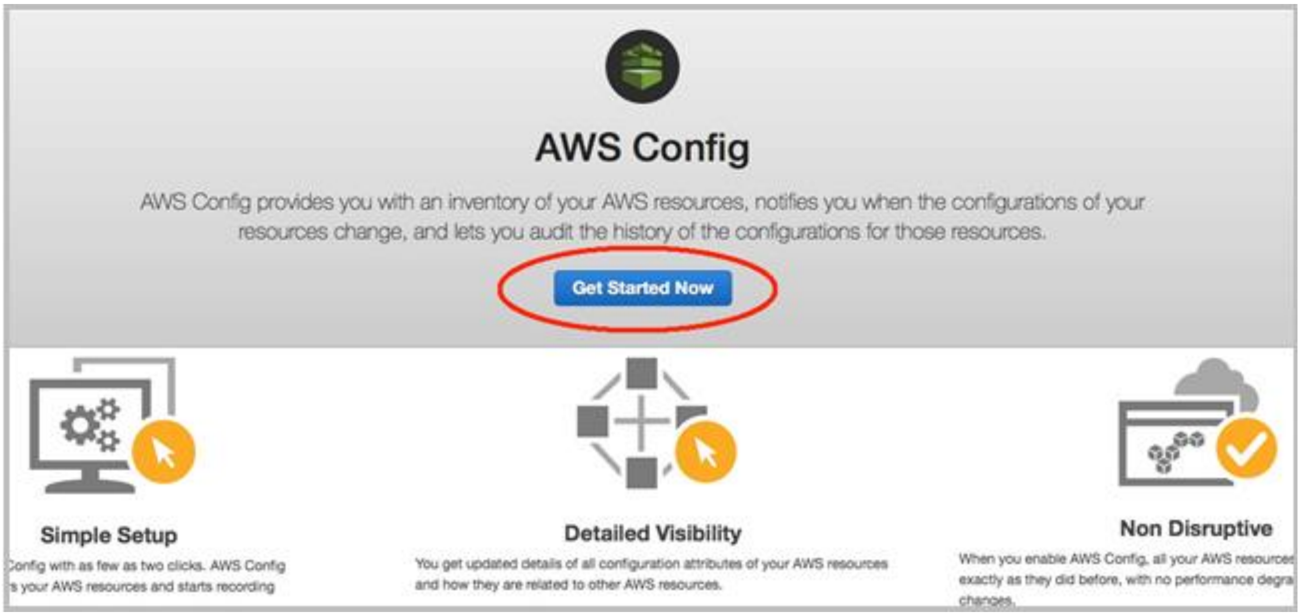
Note If you're deploying the Quick Start for testing or proof of concept, we recommend that you create a new key pair instead of specifying a key pair that's already being used by a production instance.

Set up AWS Config

If AWS Config has not yet been initialized in the region where you are deploying this Quick Start, follow the steps below **in the region where you are planning to deploy the Quick Start**.

1. Open the AWS Config console at https://console.aws.amazon.com/config/.

2. Use the region selector in the navigation bar to choose the AWS Region where you plan to deploy.
3. In the AWS Config console, choose **Get Started** (or **Get Started Now**).



AWS Config

AWS Config provides you with an inventory of your AWS resources, notifies you when the configurations of your resources change, and lets you audit the history of the configurations for those resources.

Simple Setup

Config with as few as two clicks. AWS Config
s your AWS resources and starts recording

Detailed Visibility

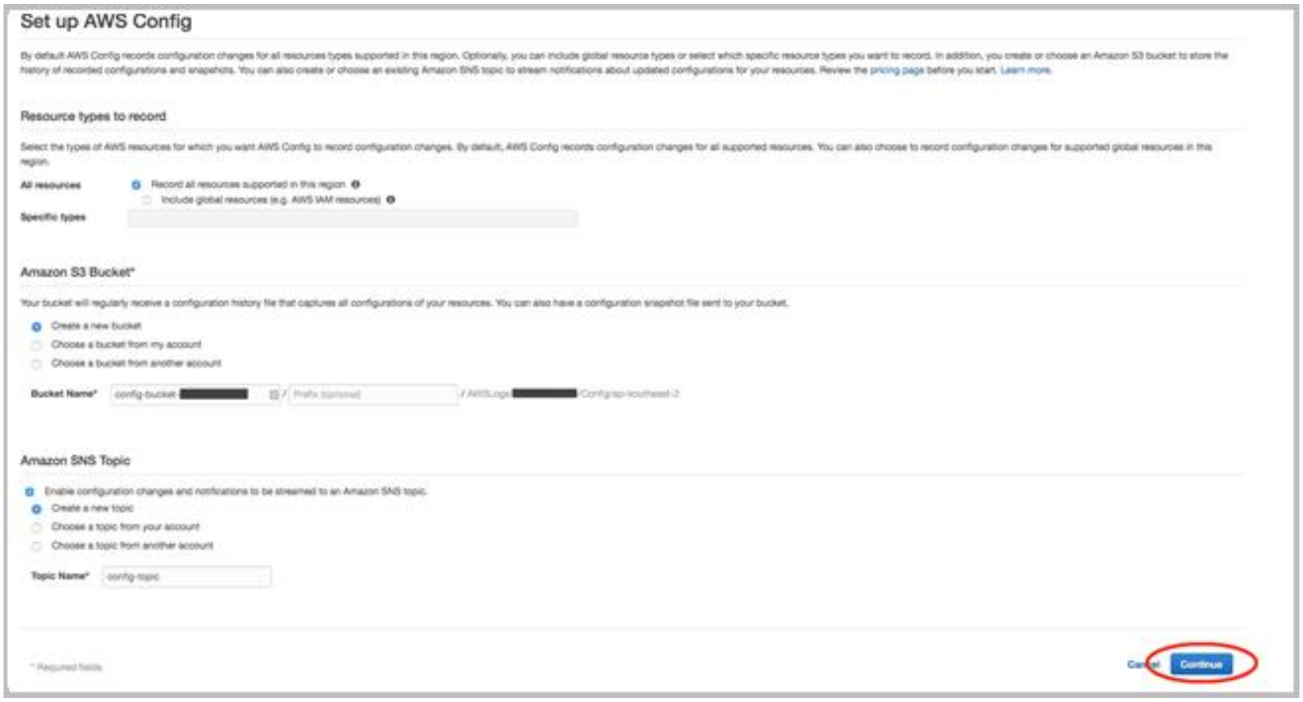
You get updated details of all configuration attributes of your AWS resources and how they are related to other AWS resources.

Non Disruptive

When you enable AWS Config, all your AWS resource
exactly as they did before, with no performance degra
changes.

Figure 6: AWS Config console

4. On the **Set up AWS Config** screen, you may leave all default values in place, or make modifications as you see fit, and then choose **Continue**.



Set up AWS Config

By default AWS Config records configuration changes for all resources types supported in this region. Optionally, you can include global resource types or select which specific resource types you want to record. In addition, you create or choose an Amazon S3 bucket to store the history of recorded configurations and snapshots. You can also create or choose an existing Amazon SNS topic to stream notifications about updated configurations for your resources. Review the pricing page before you start. Learn more.

Resource types to record

Select the types of AWS resources for which you want AWS Config to record configuration changes. By default, AWS Config records configuration changes for all supported resources. You can also choose to record configuration changes for supported global resources in this region.

All resources ☑ Record all resources supported in this region
☐ Include global resources (e.g. AWS IAM resources)

Specific types

Amazon S3 Bucket*

Your bucket will regularly receive a configuration history file that captures all configurations of your resources. You can also have a configuration snapshot file sent to your bucket.

● Create a new bucket
○ Choose a bucket from my account
○ Choose a bucket from another account

Bucket Name* config-bucket-[redacted] / Prefix (optional) / AWSLogs/[redacted]/Config/ap-southeast-2

Amazon SNS Topic

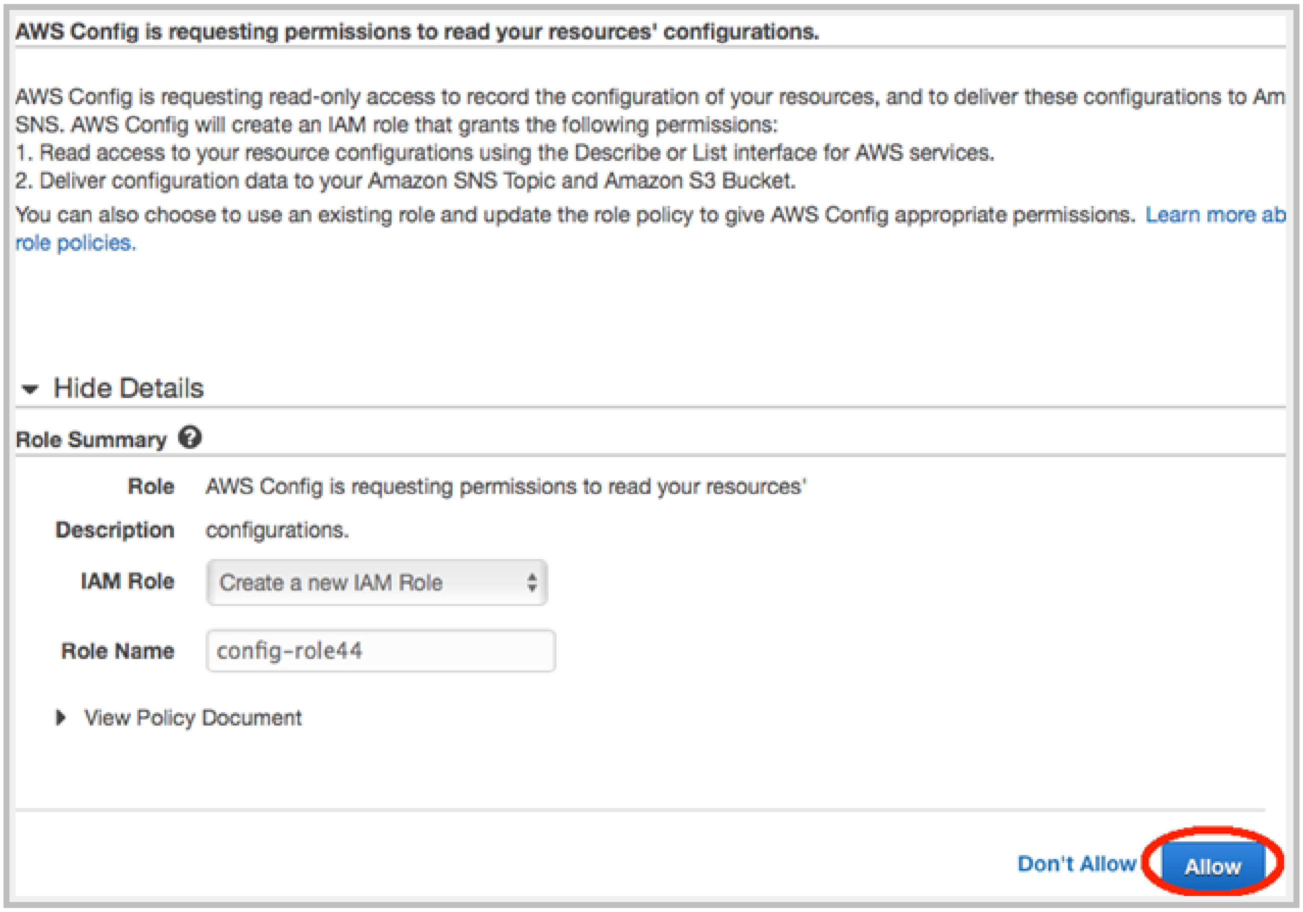
☑ Enable configuration changes and notifications to be streamed to an Amazon SNS topic.
● Create a new topic
○ Choose a topic from your account
○ Choose a topic from another account

Topic Name* config-topic

* Required fields

Figure 7: AWS Config setup screen

5. On the next screen, you are prompted to select or create an IAM role for AWS Config. You may leave all default values in place, or make modifications as you see fit, and then choose **Allow**.



AWS Config is requesting permissions to read your resources' configurations.

AWS Config is requesting read-only access to record the configuration of your resources, and to deliver these configurations to Am SNS. AWS Config will create an IAM role that grants the following permissions:
1. Read access to your resource configurations using the Describe or List interface for AWS services.
2. Deliver configuration data to your Amazon SNS Topic and Amazon S3 Bucket.

You can also choose to use an existing role and update the role policy to give AWS Config appropriate permissions. Learn more ab role policies.

Role Summary

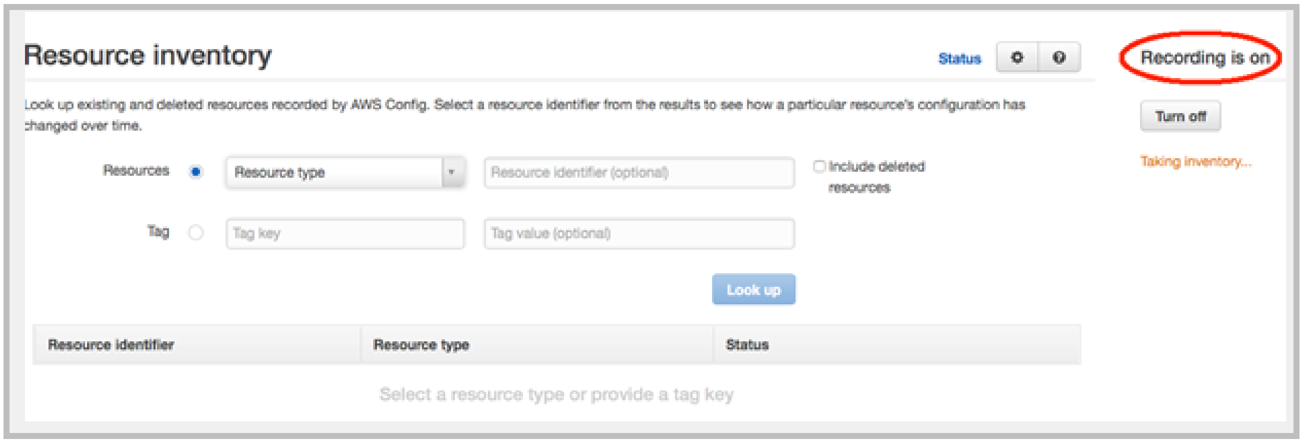
Role Description AWS Config is requesting permissions to read your resources' configurations.

IAM Role Create a new IAM Role

Role Name config-role44

Figure 8: Specifying an IAM role for AWS Config

6. On the **Resource Inventory** screen, you should now see **Recording is on** in the upper-right corner. This indicates that AWS Config is now active in this AWS Region.



Resource inventory

Look up existing and deleted resources recorded by AWS Config. Select a resource identifier from the results to see how a particular resource's configuration has changed over time.

Resource identifier	Resource type	Status

Select a resource type or provide a tag key

Figure 9: AWS Config activation

Deployment Steps

Follow the step-by-step instructions in this section to sign in to your AWS account, customize the Quick Start templates, and deploy the software into your account.

What We'll Cover

The procedure for deploying the Quick Start architecture on AWS consists of the following steps, which we'll cover in detail in the following sections.

Step 1. Sign in to your AWS account

- Sign in to your AWS account, and make sure that it's configured correctly.

Step 2. Launch the stacks

- Launch the main AWS CloudFormation template into your AWS account.
- Enter values for required parameters.
- Review the other template parameters, and customize their values if necessary.

Step 3. Test your deployment

- Use the URL provided in the **Outputs** tab for the main stack to test the deployment.
- Use the IP address for the bastion host provided by the **Outputs** tab for the main stack, and use your private key if you would like to connect to that host through SSH.

Step 1. Sign in to Your AWS Account

1. Sign in to your AWS account at http://aws.amazon.com with an IAM user role that has the appropriate privileges (see IAM Permissions earlier in this document).
2. Make sure that your AWS account is configured correctly. See the Technical Requirements and Pre-Deployment Steps sections for information. Note that if you plan to use an AWS Region with the AWS Config capability, you must first set up the AWS Config service manually by following the instructions in the previous section.
3. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy the PCI DSS architecture on AWS.

   Amazon EC2 locations are composed of *Regions* and *Availability Zones*. Regions are dispersed and located in separate geographic areas. This Quick Start uses the **m3.large** instance type for the WordPress and Nginx portion of the deployment. m3.large instances are currently available in all AWS Regions except China (Beijing). The AWS

Config Rules service is currently available only in the US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), and Asia Pacific (Tokyo) Regions.

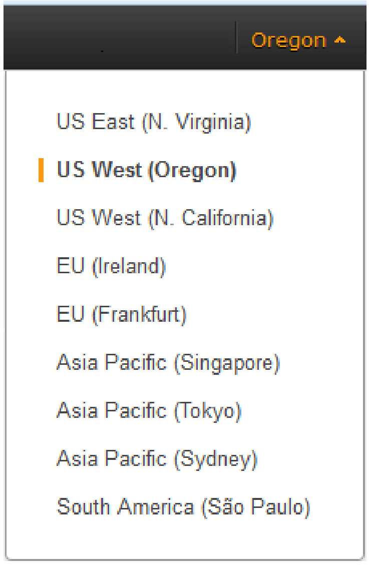


Figure 10: Choosing an AWS Region

Tip Consider choosing a region closest to your data center or corporate network to reduce network latency between systems running on AWS and the systems and users on your corporate network. If you plan to use the optional AWS Config rules capability, you must choose the US East (N. Virginia), US West (Oregon), EU (Frankfurt), EU (Ireland), or Asia Pacific (Tokyo) Region until AWS Config rules become available in other regions.

4. Select the key pair that you created earlier. In the navigation pane of the Amazon EC2 console, choose **Key Pairs**, and then choose the key pair from the list.

Step 2. Launch the Stacks

This automated AWS CloudFormation template deploys the Quick Start architecture in multiple Availability Zones into Amazon VPCs. Please review the technical requirements and pre-deployment steps before launching the stacks.

1. Launch the AWS CloudFormation template into your AWS account.

   Launch

   The template will be deployed into the AWS Region that appears in the navigation bar at the upper-right corner of the AWS Management Console. You can change the region by using the region selector in the navigation bar. Note that if you select a region where

AWS Config is available, make sure to manually initialize the AWS Config service in that region.

If you have an AWS GovCloud (US) account, you can launch the template in the AWS GovCloud (US) Region.

The stacks take approximately 30 minutes to create.

Note You are responsible for the cost of the AWS services used while running this Quick Start reference deployment. There is no additional cost for using this Quick Start. As of the date of publication, the cost for using the Quick Start with default settings is approximately $0.96 an hour, and you can complete the initial deployment for about $3.00. Prices are subject to change. See the pricing pages for each AWS service you will be using in this Quick Start for full details.

You can also download the template to use it as a starting point for your customization.

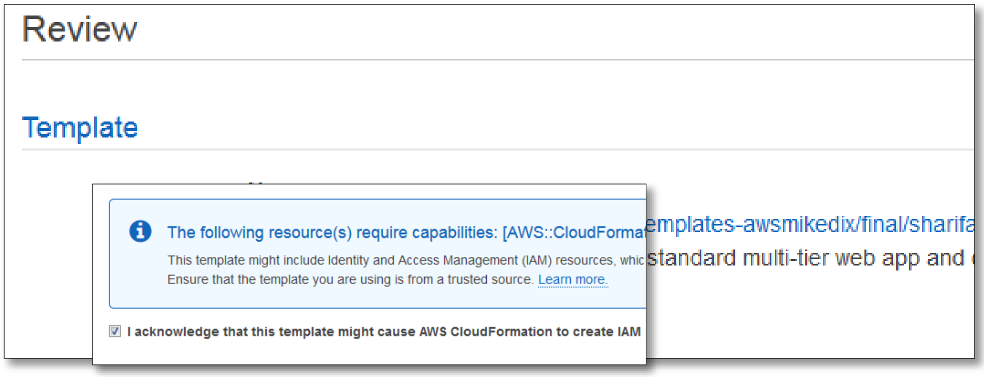
2. On the **Select Template** page, keep the default settings for the template URL, and then choose **Next**.
3. On the **Specify Details** page, provide the seven required parameter values for the template. These are described in the following table.

Label	Parameter	Default	Description
Database Password	**pDBPassword**	***Requires input***	Password for the database administrator account. This must be a complex password that's between 8 and 28 mixed, alphanumeric characters.
Notification Email Address	**pNotifyEmail**	distlist@example.org	Notification email address for security events (you will receive confirmation email).
Existing SSH Key for Bastion Instance	**pEC2KeyPairBastion**	***Requires input***	The SSH key pair in your account to use for bastion host login (see pre-deployment steps).
Existing SSH Key for Other Instances	**pEC2KeyPair**	***Requires input***	The SSH key pair in your account to use for all other host logins (see pre-deployment steps).
Support Config	**pSupportsConfig**	***Requires input***	Select **Yes** if you are deploying in an AWS Region where AWS Config is available **and** you want to use AWS Config (see pre-deployment steps).

Label	Parameter	Default	Description
First Availability Zone	**pAvailabilityZoneA**	***Requires input***	Select your desired first Availability Zone (Note: Some Availability Zones may be restricted. If the deployment fails, you may need to use a different Availability Zone.)
Second Availability Zone	**pAvailabilityZoneB**	***Requires input***	Select your desired second Availability Zone (Note: Some Availability Zones may be restricted. If the deployment fails, you may need to use a different Availability Zone.)

> **Note** You can also download the main template and edit it to create your own parameters based on your specific deployment scenario.

4. On the **Options** page, you can specify tags (key-value pairs) for resources in your stack and set additional options. You can use the tags to organize and control access to resources in the stacks. When you're done, choose **Next**.
5. On the **Review** page, review the settings and select the acknowledgement check box. This simply states that the template will create IAM resources.



Review

Template

The following resource(s) require capabilities: [AWS::CloudFormat

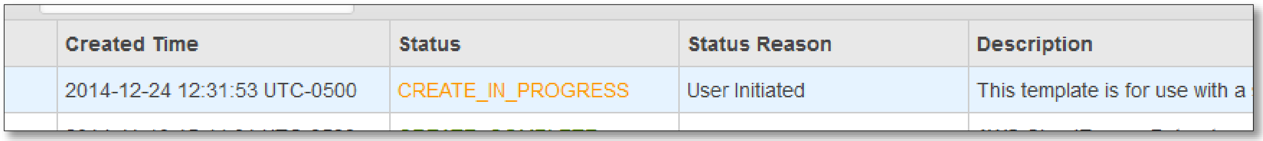
This template might include Identity and Access Management (IAM) resources, whic
Ensure that the template you are using is from a trusted source. Learn more.

☑ I acknowledge that this template might cause AWS CloudFormation to create IAM

emplates-awsmikedix/final/sharifa
standard multi-tier web app and

Figure 11: IAM resource acknowledgement

6. Choose **Create** to deploy the stack.
7. Monitor the status of the stack being deployed. When the status field shown in Figure 12 displays **CREATE_COMPLETE for all the stacks deployed**, the cluster for this reference architecture is ready. Since you're deploying the full architecture, you'll see eight stacks listed (for the main template and seven nested templates).

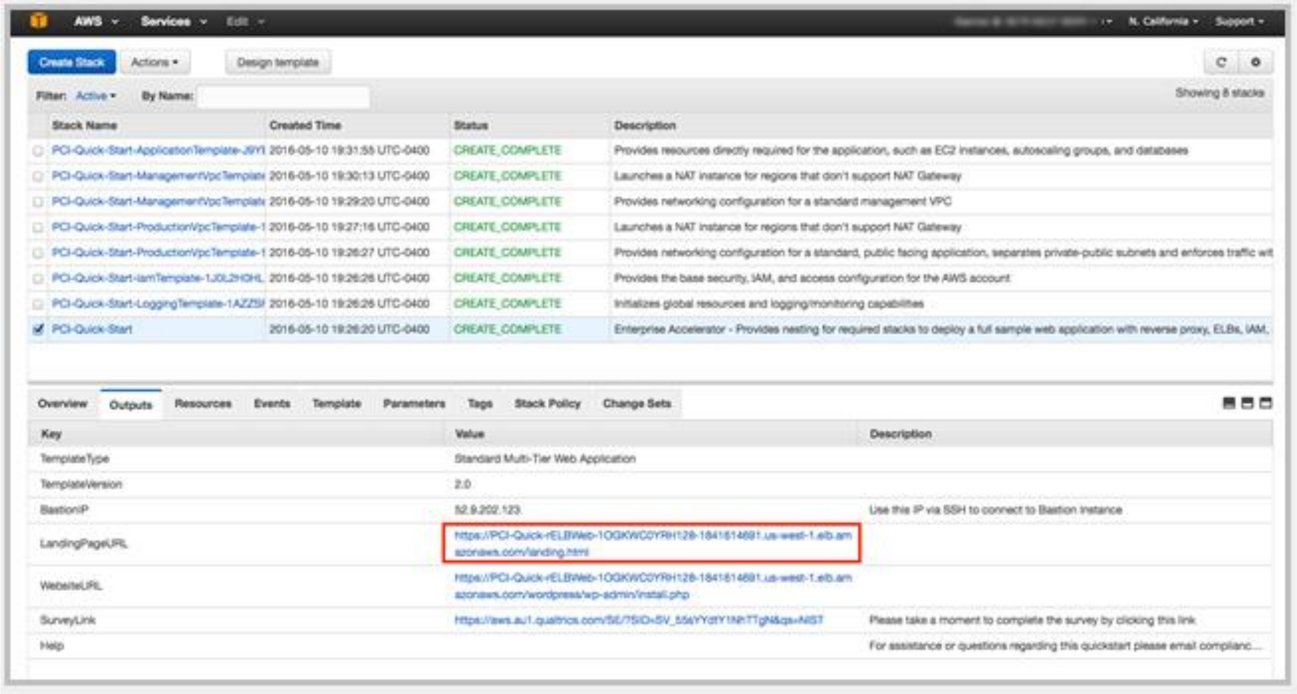


Created Time	Status	Status Reason	Description
2014-12-24 12:31:53 UTC-0500	CREATE_IN_PROGRESS	User Initiated	This template is for use with a

Figure 12: Status message for deployment

Step 3. Test Your Deployment

To test your deployment, choose the link for **LandingPageURL**, as shown in Figure 13. This URL is available from the **Outputs** tab for the main stack:

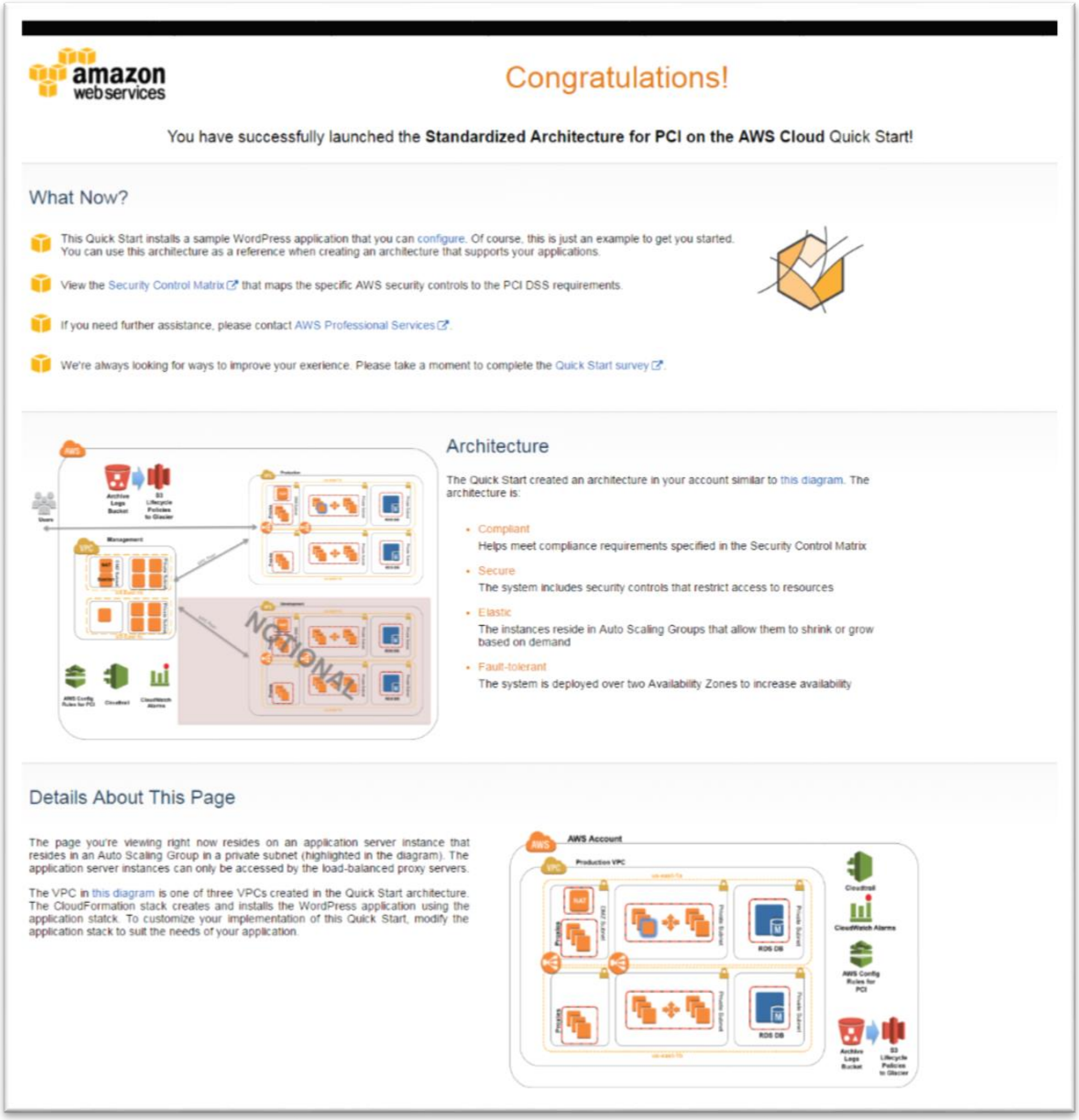


	Stack Name	Created Time	Status	Description
□	PCI-Quick-Start-ApplicationTemplate-J9YI	2016-05-10 19:31:55 UTC-0400	CREATE_COMPLETE	Provides resources directly required for the application, such as EC2 instances, autoscaling groups, and databases
□	PCI-Quick-Start-ManagementVpcTemplat	2016-05-10 19:30:13 UTC-0400	CREATE_COMPLETE	Launches a NAT instance for regions that don't support NAT Gateway
□	PCI-Quick-Start-ManagementVpcTemplat	2016-05-10 19:29:20 UTC-0400	CREATE_COMPLETE	Provides networking configuration for a standard management VPC
□	PCI-Quick-Start-ProductionVpcTemplate-1	2016-05-10 19:27:16 UTC-0400	CREATE_COMPLETE	Launches a NAT instance for regions that don't support NAT Gateway
□	PCI-Quick-Start-ProductionVpcTemplate-1	2016-05-10 19:26:27 UTC-0400	CREATE_COMPLETE	Provides networking configuration for a standard, public facing application, separates private-public subnets and enforces traffic wit
□	PCI-Quick-Start-IamTemplate-1J0L2HGHL	2016-05-10 19:26:26 UTC-0400	CREATE_COMPLETE	Provides the base security, IAM, and access configuration for the AWS account
□	PCI-Quick-Start-LoggingTemplate-1AZZS	2016-05-10 19:26:26 UTC-0400	CREATE_COMPLETE	Initializes global resources and logging/monitoring capabilities
☑	PCI-Quick-Start	2016-05-10 19:26:20 UTC-0400	CREATE_COMPLETE	Enterprise Accelerator - Provides nesting for required stacks to deploy a full sample web application with reverse proxy, ELBs, IAM,

Key	Value	Description
TemplateType	Standard Multi-Tier Web Application	
TemplateVersion	2.0	
BastionIP	52.9.202.123	Use this IP via SSH to connect to Bastion instance
LandingPageURL	https://PCI-Quick-rELBWeb-1OGKWC0YRH128-1841614691.us-west-1.elb.amazonaws.com/landing.html	
WebsiteURL	https://PCI-Quick-rELBWeb-1OGKWC0YRH128-1841614691.us-west-1.elb.amazonaws.com/wordpress/wp-admin/install.php	
SurveyLink	https://aws.au1.qualtrics.com/SE/?SID=SV_55sYYdlY1NhTTgN&qs=NIST	Please take a moment to complete the survey by clicking this link
Help		For assistance or questions regarding this quickstart please email complianc...

Figure 13: Opening the landing page

The link should launch a new page in your browser that looks similar to Figure 14.



Congratulations!

You have successfully launched the **Standardized Architecture for PCI on the AWS Cloud** Quick Start!

What Now?

- This Quick Start installs a sample WordPress application that you can configure. Of course, this is just an example to get you started. You can use this architecture as a reference when creating an architecture that supports your applications.
- View the Security Control Matrix that maps the specific AWS security controls to the PCI DSS requirements.
- If you need further assistance, please contact AWS Professional Services.
- We're always looking for ways to improve your exerience. Please take a moment to complete the Quick Start survey.

Architecture

The Quick Start created an architecture in your account similar to this diagram. The architecture is:

- Compliant
  Helps meet compliance requirements specified in the Security Control Matrix
- Secure
  The system includes security controls that restrict access to resources
- Elastic
  The instances reside in Auto Scaling Groups that allow them to shrink or grow based on demand
- Fault-tolerant
  The system is deployed over two Availability Zones to increase availability

Details About This Page

The page you're viewing right now resides on an application server instance that resides in an Auto Scaling Group in a private subnet (highlighted in the diagram). The application server instances can only be accessed by the load-balanced proxy servers.

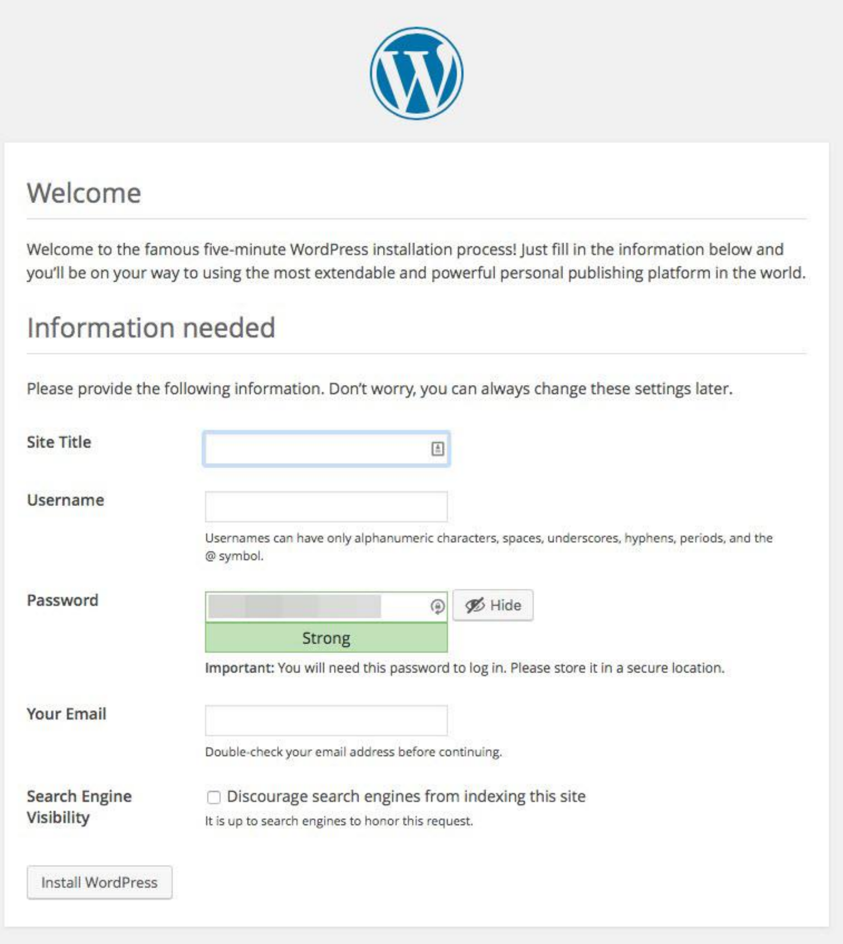
The VPC in this diagram is one of three VPCs created in the Quick Start architecture. The CloudFormation stack creates and installs the WordPress application using the application statck. To customize your implementation of this Quick Start, modify the application stack to suit the needs of your application.

Figure 14: Landing page for PCI architecture on AWS

This deployment builds a working demo of a Multi-AZ WordPress site. To connect to the WordPress site, choose the URL provided for the WordPress application on the landing page shown in Figure 14. This URL is also available from the **WebsiteURL** link on the **Outputs** tab for the main stack.

> **Note** WordPress is provided for testing and proof-of-concept purposes only; it is not intended for production use. You can replace it with another application of your choice.

This URL brings up the page shown in Figure 15. You can install and test the WordPress deployment from here.



Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Don't worry, you can always change these settings later.

Site Title

Username

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password

Hide

Strong

Important: You will need this password to log in. Please store it in a secure location.

Your Email

Double-check your email address before continuing.

Search Engine Visibility

□ Discourage search engines from indexing this site

It is up to search engines to honor this request.

Install WordPress

Figure 15: Installing WordPress

Note The WordPress application included in this Quick Start deployment is for demo purposes only. Application-level security, including patching, operating system updates, and addressing application vulnerabilities, is the customer's responsibility (see the AWS Shared Responsibility Model). **For this Quick Start, we recommend that you delete the AWS CloudFormation stacks after your proof-of-concept demo or testing is complete.**

Now that you've deployed and tested the PCI architecture on AWS, please take a few minutes to complete our survey for this Quick Start. Your response is anonymous and will help us improve AWS Enterprise Accelerator – Compliance reference deployments.

Deleting the Stacks

When you've finished using the baseline environment, you can delete the stacks. Deleting a stack, either via CLI and APIs or through the AWS CloudFormation console, will remove all the resources created by the template for that stack. **The only exceptions are the S3 buckets for logging and backup. By default, the deletion policy for those buckets is set to "Retain," so you have to delete them manually.**

> **Important** This Quick Start deployment uses nested AWS CloudFormation templates, so deleting the main stack will remove the nested stacks and all associated resources.

Troubleshooting

If you encounter a **CREATE_FAILED** error when you deploy the Quick Start, refer to the following table for known issues and solutions.

Error message	Possible cause	What to do
The following resource(s) failed to create: [rConfigRuleForRequiredTags, rConfigRuleForUnrestrictedPorts, rConfigRuleForSSH, rConfigRulesLambdaRole]	The **Support Config** parameter was set to **Yes**, but AWS Config isn't available in the region you selected, or AWS Config has not been initialized.	Set the **Support Config** parameter to **No**, or select another region. Also make sure that AWS Config is set up properly, as described in the pre-deployment steps.
Maximum VPCs limit reached	You've exceeded the number of VPCs allowed in your account.	Delete VPCs and/or request a limit increase. Try to create the stack again. For more information, see technical requirements.
Maximum EIPs limit reached	You've exceeded the limit of Elastic IP addresses in your account.	Disassociate Elastic IPs or request a Elastic IP limit increase, and try to create the stack again. For more information, see technical requirements.
Other limits exceeded	You've exceeded the use of resources in your AWS account.	See technical requirements, and request service limit increases as necessary.

If the problem you encounter isn't covered in this table, we recommend that you re-launch the template with **Rollback on failure** set to **No** (this setting is under **Advanced** in the AWS CloudFormation console, **Options** page) and open a support case in the AWS Support Center for further troubleshooting. When rollback is disabled, the stack's state will be retained and the instance will be left running, so the support team can help troubleshoot the issue.

> **Important** When you set **Rollback on failure** to **No**, you'll continue to incur AWS charges for this stack. Please make sure to delete the stack when you've finished troubleshooting.

Integrating with AWS Service Catalog

You can add the AWS CloudFormation templates for this Quick Start to AWS Service Catalog as portfolios or products to manage them from a central location. This helps support consistent governance, security, and compliance requirements. It also enables users to quickly deploy only the approved IT services they need.

For complete information about using AWS Service Catalog, see the AWS documentation. The following table provides links for specific tasks.

To	See
Create a new portfolio	Creating and Deleting Portfolios
Create a new product	Adding and Removing Products
Give users access	Granting Access to Users
Assign IAM roles for deploying stacks	Applying Launch Constraints Make sure that the IAM role has a policy and trust relationship defined.
Assign tags to portfolios to track resource ownership, access, and cost allocations	Tagging Portfolios
Perform other administrative tasks	AWS Service Catalog Administrator Guide
Launch products from AWS Service Catalog	AWS Service Catalog User Guide

Additional Resources

AWS services

- AWS CloudFormation
  https://aws.amazon.com/documentation/cloudformation/
- Amazon EC2 User Guide for Linux:
  https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html
- Amazon VPC
  https://aws.amazon.com/documentation/vpc/
- AWS CloudTrail
  https://aws.amazon.com/documentation/cloudtrail/
- AWS Config
  https://aws.amazon.com/documentation/config/
- Amazon CloudWatch
  https://aws.amazon.com/documentation/cloudwatch/
- AWS Identity and Access Management
  https://aws.amazon.com/documentation/iam/
- Amazon RDS
  https://aws.amazon.com/documentation/rds/
- AWS CLI
  https://aws.amazon.com/documentation/cli/
- AWS Service Catalog
  https://aws.amazon.com/documentation/servicecatalog/

PCI DSS

- PCI Data Security Standard version 3.1
  https://www.pcisecuritystandards.org/documents/PCI_DSS_v3-1.pdf
- Technical Workbook for PCI Compliance in the AWS Cloud
  http://d0.awsstatic.com/whitepapers/compliance/AWS_Anitian_Wookbook_PCI_Cloud_Compliance.pdf

AWS Enterprise Accelerators

- AWS Enterprise Accelerators website
  https://aws.amazon.com/professional-services/enterprise-accelerators/

Quick Start Reference Deployments

- AWS Quick Start home page
  https://aws.amazon.com/quickstart/
- Quick Start deployment guides
  https://aws.amazon.com/documentation/quickstart/

Appendix: Enhancements in This Release

This is second in a set of *AWS Enterprise Accelerator – Compliance* Quick Starts. AWS is constantly working to improve the design, ease of use, and security features of these solutions. This latest compliance Quick Start for PCI DSS includes the following security and compliance enhancements:

- HTTPS load balancers with custom security policy using TLS and auto-generation of a self-signed certificate for testing purposes
- Network access control list (ACL) rules for filtering ingress/egress traffic as an additional layer of network security
- Security groups to limit both inbound and outbound traffic to only available ports and protocols
- AWS Config rules automatically deployed for monitoring specific resources most relevant to compliance
- Secure Amazon S3 policies for logging and application buckets, including custom lifecycle policies for archiving objects in Amazon Glacier and use of versioning
- Custom CloudWatch alarms and notifications for specific security-related events in CloudTrail logging of root activity, IAM changes, and changes to logging policies
- Simplified AWS CloudFormation templates that decouple components, including VPCs, to allow for easier modification and reuse
- Reduced set of AWS CloudFormation parameter groups and labels to simplify console use during the deployment process
- Elastic Load Balancing and Amazon S3 access logging enabled for the application layer
- Deployment of a secured login bastion host for SSH access to Amazon EC2 instances within the architecture

Send Us Feedback

We welcome your questions and comments. Please post your feedback on the AWS Quick Start Discussion Forum.

If you haven't filled out our survey yet, please take a few minutes to do so. Your response is anonymous and will help us improve the quality of this PCI DSS Quick Start and other AWS Enterprise Accelerator – Compliance reference deployments.

For Further Assistance

If you need assistance with an enterprise implementation of the capabilities introduced through this Quick Start, AWS Professional Services offers an Enterprise Accelerator-Compliance service to guide and assist with the related training, customization, and implementation of deployment and maintenance processes. Please contact your AWS Account Manager for further information, or send an inquiry to compliance-accelerator@amazon.com.

Document Revisions

Date	Change	In sections
June 2016	Support for the new Asia Pacific (Mumbai) region	Template updates
May 2016	Major updates based on user feedback to align with changes to AWS CloudFormation templates and to reduce customization requirements	Template updates and changes throughout guide
April 2016	Pre-release	—

Notices

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