AWS can provide you with AWS credits for this deployment. Please fill out our form and we will reach out to you.

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This Quick Start deployment guide was created by Pivotal in collaboration with Amazon Web Services (AWS).

Quick Starts are automated reference deployments for key technologies on the AWS Cloud, based on AWS best practices for security and high availability.

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying Pivotal Cloud Foundry (PCF) on the AWS Cloud.

Pivotal Cloud Foundry (PCF), the leading commercial distribution of Cloud Foundry, includes these components:
- **Pivotal Application Service** (PAS), a modern platform for running applications.
- **Pivotal Container Service** (PKS), a Kubernetes service for running containers.

This Quick Start focuses on deploying PAS on AWS.

For more information about PCF, see the [Pivotal website](https://www.pivotal.io). For detailed documentation on PCF, see the [Pivotal documentation](https://docs.pivotal.io).

**PAS on AWS**

This Quick Start deploys a single installation of PCF; each installation is called a *PCF foundation*. The PCF foundation is deployed either as **Small Footprint**, **Starter**, or as a **Multi-AZ environment**. In the Small Footprint and the Starter deployments, most jobs exist in one Availability Zone on a single Amazon Elastic Compute Cloud (Amazon EC2) instance (VM). In the Multi-AZ configuration, jobs exist in two Availability Zones with redundant instances.

The deployment includes the following PCF components:

- **Ops Manager** – A dashboard that operators and administrators can use to manage their PCF instance
- **Pivotal Application Service** (PAS) – A scalable application platform, extensible to most modern frameworks
- **Apps Manager** – A tool that helps developers manage applications and service bindings
- **AWS Service Broker** – An open-source project that enables PCF users to create and manage AWS resources from the Apps Manager or the [Cloud Foundry Command Line Interface](https://docs.cloudfoundry.org/command-line/index.html) (CF CLI)

After you deploy the Quick Start, you can scale the PAS environment by using Pivotal Ops Manager. Once PCF is up and running, you can also install complimentary products and services such as **PCF Metrics**, **Spring Cloud Services for PCF**, **PCF App Autoscaler**, **Single Sign-on (SSO) for PCF**, and **PAS for Windows** from the Ops Manager. You can download these and several other services, including data services, from [Pivotal Network](https://www.pivotal.io).
High Availability for PAS on AWS
This Quick Start provides four layers of high availability within the PAS foundation:

- Health management for app instances – New instances are brought online if a failure is detected.
- Monitored processes – Failed platform component processes are automatically restarted.
- Health management for virtual machines – Failed instances are automatically resurrected.
- Availability Zones – If you choose the Multi-AZ configuration, PAS automatically routes traffic across two Availability Zones. If a failure occurs in one zone, traffic is routed to the other zone.

For more information about high availability for PAS, see the PCF documentation.

Costs and Licenses
The Quick Start includes a 90-day free evaluation of PAS on AWS. You can use the trial version to independently evaluate the platform and its capabilities, or contact Pivotal for a proof-of-concept installation.

During the Quick Start deployment, you will need to accept the Pivotal Cloud Foundry End User License Agreement (EULA). You must also supply a Pivotal Network API token, as explained in the Prerequisites section.

This Quick Start deploys a recent major version of PAS by default. However, there could be a delay before a new version of the PAS that was published in the Pivotal Network becomes available in the Quick Start.

You are responsible for the cost of the AWS infrastructure, storage, and data services used while running this Quick Start reference deployment. There is no additional cost for using the Quick Start.

The AWS CloudFormation template for this Quick Start includes configuration parameters for PAS. Some of these settings, such as the deployment size, will affect the cost of deployment.
Architecture

The Quick Start offers three deployment options for PAS:

- **Small Footprint PAS** — The Small Footprint Pivotal Application Services (PAS) is a repackaging of the PAS components into a smaller deployment with fewer EC2 instances (10). This option is designed for use cases with 2,500 or fewer applications. It allows for rapid deployment, and is ideal for testing purposes, developer proof of concepts, and operational compatibility testing. We recommend using the Small Footprint option to increase efficiency and reduce costs during testing and evaluation. For more information about this option, see the Pivotal documentation.

- **Starter** — This option deploys about 22 EC2 instances. You can scale the platform in the Ops Manager to add more capacity after the initial deployment.

- **Multi-AZ** — This deployment is almost twice the size of the Starter deployment. It includes about 40 EC2 instances spanning two Availability Zones and provides a fourth layer of availability, as discussed earlier.

The Multi-AZ option is designed for near production-grade environments. We recommend that you choose the Small Footprint or the Starter option if you’re evaluating the platform or if you want to begin with a smaller environment and add capacity later.

The Quick Start also offers the AWS Service Broker, which enables PCF users to create and manage AWS resources from the Apps Manager or the Cloud Foundry Command Line Interface (CF CLI). This one-time installation enables app developers to create and manage service instances. For more information about the AWS Service Broker, see the AWS Service Broker documentation.
The Quick Start deploys and configures the following components:

- A virtual private cloud (VPC) configured with two public and four private subnets. The Quick Start builds a **new** VPC for your deployment; it doesn’t support deployments into an existing VPC.
- An internet gateway to provide access to the internet.
- In a public subnet, a network address translation (NAT) instance to allow outbound internet connectivity for resources in the private subnets.
- Three Elastic Load Balancing (ELB) load balancers.
- All required Pivotal Cloud Foundry components, including Bootstrap, Ops Manager, BOSH Director, and PAS instances.
• Amazon Simple Storage Service (Amazon S3) buckets for storage of buildpacks, droplets, packages, and resources.

• Amazon Relational Database Service (Amazon RDS) MySQL DB instance and alternate instance for PCF internal use.

• Amazon Route 53 for creating a hosted zone for your PAS domain.

• Secure Shell (SSH) access to application containers.

• Optional support for TCP routing with TCP routers.

Prerequisites

Specialized Knowledge

Before you deploy this Quick Start, we recommend that you become familiar with the following AWS services. (If you are new to AWS, see the Getting Started Resource Center.)

• Amazon VPC
• Amazon EC2
• Amazon S3
• Elastic Load Balancing
• Amazon Route 53
• Amazon RDS

This Quick Start also assumes that you’re familiar with PCF components and concepts. For more information, see the Pivotal website.

Technical Requirements

Domain

For this Quick Start, you must provide a single, pre-existing domain. You’ll specify the domain name in the Domain parameter when you deploy the Quick Start, in step 4. The Quick Start auto-configures a system domain to host system components, and an apps domain, to host applications, from the domain name.

For example, let’s say you specified pcf.example.com for the PAS domain. The Quick Start configures the following:

• PAS system domain: sys.pcf.example.com
• PAS apps domain: apps.pcf.example.com
SSL Certificate
You’ll need an SSL certificate that supports the necessary domains. The certificate can be self-signed if you’re using the deployment for testing and development. For production environments, we recommend that you obtain a certificate verified by a certificate authority (CA).

To generate a self-signed certificate, you can use the `gen_ssl_certs.sh` script we’ve provided in the GitHub repository.

For example, if you run this script for `pcf.example.com`, it will output two files:

- `pcf.example.com.crt`
- `pcf.example.com.key`

This certificate will support the following domains:

- `*.pcf.example.com`
- `*.sys.pcf.example.com`
- `*.apps.pcf.example.com`
- `*.login.sys.pcf.example.com`
- `*.uaa.sys.pcf.example.com`

You’ll then import `pcf.example.com.crt` and `pcf.example.com.key` by using the AWS Certificate Manager, as described in step 3.

Pivotal Network (Pivnet) Account
The Quick Start deployment downloads the necessary software for the installation from the Pivotal Network (Pivnet). To initiate this download, you’ll need to provide a Pivotal Network API token when you deploy the Quick Start. To find this token:

1. Create a Pivnet account at https://network.pivotal.io/.
2. Log in to your Pivnet account from a web browser.
3. Click your name in the upper-right corner.
4. Choose Edit Profile.

You’ll find your API token at the bottom of this page.
Deployment Details

Stacks
The Quick Start template creates an AWS CloudFormation stack with the default name *Pivotal-Cloud-Foundry*. This main stack creates two child stacks, so the PCF deployment results in three stacks.

AWS Resources
The PCF deployment provisions the following AWS resources:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Quantity</th>
<th>Names and details</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPCs</td>
<td>1</td>
<td>pcf-vpc</td>
</tr>
<tr>
<td>Elastic IP addresses</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>for the NAT instance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network interfaces</td>
<td>6</td>
<td>• 2 public subnets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 4 private subnets</td>
</tr>
<tr>
<td>ELB load balancers</td>
<td>3</td>
<td>stackname-pcf-elb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stackname-pcf-ssh-elb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stackname-pcf-tcp-elb</td>
</tr>
<tr>
<td>Security groups</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>S3 buckets</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Instances (VMs)</td>
<td>10</td>
<td>1 NAT instance (t2.medium, user-configurable)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Ops Manager instance (m4.large)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Bootstrap instance (t2.micro)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 BOSH instance (m4.large)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pivotal Application Service (PAS) instances:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Starter deployment:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 t2.micro instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 r4.xlarge instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 m4.large instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 t2.small instance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multi-AZ deployment:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27 t2.micro instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 r4.xlarge instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 m4.large instances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 t2.large instance</td>
</tr>
<tr>
<td>Key pairs</td>
<td>2</td>
<td>• <strong>User-specified:</strong> This is the key pair you specify in the Quick Start template. It is used for the NAT, Ops Manager, and Bootstrap instances.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Autogenerated:</strong> The Quick Start generates a key pair named <code>stackname-pcf-keypair</code> for all PAS instances.</td>
</tr>
</tbody>
</table>


Deployment Steps

Step 1. Prepare Your AWS Account

1. If you don’t already have an AWS account, create one at https://aws.amazon.com by following the on-screen instructions.

2. Use the region selector in the navigation bar to choose the AWS Region where you want to deploy PAS on AWS.

   Note  This Quick Start isn’t currently supported in all AWS Regions. For a current list of supported regions, see the AMIMapping section of the AWS CloudFormation template.

3. Create a key pair in your preferred region and save the .pem file on your computer. You can also use an existing key pair. The key pair is used for the NAT, Bootstrap, and Ops Manager instances.

4. If necessary, request a service limit increase for the AWS resources you’ll be using. You might need to do this if you already have existing deployments that use these resources, and you think you might exceed the default limits with this reference deployment. The following table lists the required resources.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Default limit</th>
<th>Quick Start requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELB load balancers</td>
<td>20 per region</td>
<td>3</td>
</tr>
<tr>
<td>Amazon RDS storage</td>
<td>100 TiB</td>
<td>db.m4.xlarge instance with 100 GiB of allocated storage</td>
</tr>
<tr>
<td>S3 buckets</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>EC2 instances</td>
<td>20</td>
<td>10 for Small Footprint deployment 22 for Starter deployment 40 for Multi-AZ deployment</td>
</tr>
</tbody>
</table>

Step 2. Create a Hosted Zone

Create a hosted zone for your PAS domain in Amazon Route 53. You may use an existing domain that’s defined in Route 53. If your domain is registered with a DNS provider other than AWS, you’ll need to create a subdomain in Route 53, and then create a hosted zone for the subdomain. For instructions, see the Route 53 documentation.
For example, if you have a domain called example.com registered with a different service provider, you may optionally create a subdomain called pcf.example.com and its corresponding hosted zone in Route 53. The Quick Start will use this hosted zone.

Step 3. Import the SSL Certificate for Your Domain into AWS Certificate Manager

You’ll need to import the SSL certificate for your domain into the AWS Certificate Manager. If your PAS domain is pcf.example.com, at the minimum, your certificate must support the following domains:

- *.sys.pcf.example.com
- *.apps.pcf.example.com

You may also add the following domains to your certificate. This will be helpful if you plan to install products like Spring Cloud Services for PCF in the future. By including them now, you can avoid having to generate the certificate again later, when you add services.

- *.login.sys.pcf.example.com
- *.uaa.sys.pcf.example.com

For more information about how to import SSL certificates, see the AWS Certificate Manager documentation.

Step 4. Launch the Quick Start

**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. For full details, see the pricing pages for each AWS service you will be using in this Quick Start. Prices are subject to change.

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

   ![Launch Quick Start](Launch Quick Start)

   This stack takes 2.5 to 3 hours to create.

2. Check the AWS Region that’s displayed in the upper-right corner of the navigation bar, and change it if necessary. This is where the PAS environment will be built. The template is launched in the US West (Oregon) Region by default.
3. On the Select Template page, keep the default setting for the template URL, and then choose Next.

4. On the Specify Details page, change the stack name if needed. Review the parameters for the template. Provide values for the parameters that require input. For all other parameters, review the default settings and customize them as necessary. When you finish reviewing and customizing the parameters, choose Next.

Parameters are grouped in six categories and described in the following tables.

Amazon EC2 Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keypair (PCFKeyPair)</td>
<td>Requires input</td>
<td>Public/private key pair, which allows you to connect securely to your instances after launch. When you created an AWS account, this is the key pair you created in your preferred region. You'll use this key pair for the Pivotal Ops Manager and NAT instances.</td>
</tr>
<tr>
<td>NAT Instance Type (NATInstanceType)</td>
<td>t2.medium</td>
<td>EC2 instance type to use for the NAT instance.</td>
</tr>
<tr>
<td>SSL Certificate ARN (SSLCertificateARN)</td>
<td>Requires input</td>
<td>ARN for the pre-uploaded SSL certificate. The certificate should cover the PAS domain and its subdomains, i.e., *.pcfdomain, *.sys.pcfdomain, *.apps.pcfdomain, *.login.sys.pcfdomain, and *.uaa.sys.pcfdomain, where pcfdomain represents your existing PAS domain, as specified in the Domain parameter. For more information, see Technical Requirements and step 3.</td>
</tr>
<tr>
<td>ELB Prefix (ElbPrefix)</td>
<td>Requires input</td>
<td>Prefix for the name of the ELB load balancers provisioned. This is a 1-19 character string.</td>
</tr>
<tr>
<td>Allow HTTP on ELB (AllowHttpOnElb)</td>
<td>true</td>
<td>Set to false if you don’t want to allow HTTP traffic on the PCF ELB load balancer on port 80. By default, HTTP traffic is allowed.</td>
</tr>
<tr>
<td>Forward Log Output (ForwardLogOutput)</td>
<td>false</td>
<td>Set to true if you want to send installation logs to Amazon CloudWatch Logs, to debug deployment issues. For more information, see Using CloudWatch Logs. Important Setting this parameter to true potentially exposes secrets used during the bootstrapping process. We recommend that you use this setting only for testing and debugging purposes.</td>
</tr>
</tbody>
</table>
Network and DNS Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ops Manager &amp; Bootstrap Ingress</strong> (OpsManagerIngress)</td>
<td>Requires input</td>
<td>CIDR range allowed to connect to the Pivotal Ops Manager and Bootstrap instances. Note that a value of 0.0.0.0/0 will allow access from any IP address.</td>
</tr>
<tr>
<td><strong>Route 53 Hosted Zone ID</strong> (HostedZoneId)</td>
<td>Requires input</td>
<td>Existing hosted zone in which to create DNS records, from step 2.</td>
</tr>
<tr>
<td><strong>Domain</strong> (Domain)</td>
<td>Requires input</td>
<td>Root or subdomain for all Pivotal Application Service DNS entries (e.g. example.com or pcf.example.com). This must match the hosted zone ID.</td>
</tr>
</tbody>
</table>

Pivotal Cloud Foundry Configuration:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size of the Deployment</strong> (DeploymentSize)</td>
<td>Requires input</td>
<td>The size of the deployment. You can choose Small Footprint, Starter, or Multi-AZ. Choosing Multi-AZ creates a highly available deployment, with nearly double the number of instances of the Starter deployment. Small Footprint deployment creates a reduced deployment for assessment purposes. For more information, see the Architecture section.</td>
</tr>
<tr>
<td><strong>Skip SSL Validation</strong> (SkipSSLValidation)</td>
<td>false</td>
<td>Set to true if you don’t want SSL certificates to be validated (not recommended for a production environment).</td>
</tr>
<tr>
<td><strong>Pivotal Network Token</strong> (PivnetToken)</td>
<td>Requires input</td>
<td>Pivotal Network API token to accept EULA (requires a Pivotal Network account). For information about how to obtain this token, see the Prerequisites section.</td>
</tr>
<tr>
<td><strong>Admin Email</strong> (AdminEmail)</td>
<td>Requires input</td>
<td>Administrator email used to monitor the MySQL service.</td>
</tr>
<tr>
<td><strong>Ops Manager Admin Password</strong> (OpsManagerAdmin Password)</td>
<td>Requires input</td>
<td>Administrator password for Pivotal Ops Manager. The password must be at least 14 characters, including alphanumeric characters, dashes, and underscores.</td>
</tr>
<tr>
<td><strong>Custom Branding Company Name</strong> (CompanyName)</td>
<td>PCF Quickstart</td>
<td>The company name for custom-branding Apps Manager. For more information, see the Pivotal documentation.</td>
</tr>
</tbody>
</table>

Amazon RDS:

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RDS DB Name</strong> (RdsDBName)</td>
<td>bosh</td>
<td>The name of the Amazon RDS database.</td>
</tr>
<tr>
<td>Parameter label (name)</td>
<td>Default</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>RDS Username (RdsUsername)</td>
<td>Requires input</td>
<td>The user name for the Amazon RDS database.</td>
</tr>
<tr>
<td>RDS Password (RdsPassword)</td>
<td>Requires input</td>
<td>The password for accessing the Amazon RDS database.</td>
</tr>
</tbody>
</table>

**AWS Quick Start Configuration:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Start S3 Bucket Name (QSS3BucketName)</td>
<td>aws-quickstart</td>
<td>S3 bucket where the Quick Start templates and scripts are installed. Use this parameter to specify the S3 bucket name you’ve created for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. The bucket name can include numbers, lowercase letters, uppercase letters, and hyphens, but should not start or end with a hyphen.</td>
</tr>
<tr>
<td>Quick Start S3 Key Prefix (QSS3KeyPrefix)</td>
<td>quickstart-pivotal-cloudfoundry/</td>
<td>The S3 key name prefix used to simulate a folder for your copy of Quick Start assets, if you decide to customize or extend the Quick Start for your own use. This prefix can include numbers, lowercase letters, uppercase letters, hyphens, and forward slashes.</td>
</tr>
</tbody>
</table>

**Pivotal’s End User License Agreement:**

<table>
<thead>
<tr>
<th>Parameter label (name)</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept EULA (AcceptEULA)</td>
<td>No</td>
<td>Choose Yes to confirm that you have reviewed the Pivotal Software Evaluation Agreement for On-Demand Services at <a href="https://pivotal.io/evaluation-agreement">https://pivotal.io/evaluation-agreement</a>, and you agree that your use of the software will be governed by the terms of this agreement.</td>
</tr>
</tbody>
</table>

5. On the **Options** page, you can specify tags (key-value pairs) for resources in your stack and set advanced options. When you’re done, choose **Next**.

6. On the **Review** page, review and confirm the template settings. Under **Capabilities**, select the check box to acknowledge that the template will create IAM resources.

7. Choose **Create** to deploy the stack.

8. Monitor the status of the stack. When the status is **CREATE_COMPLETE**, the deployment is ready. Approximately 20-30 minutes into your deployment, you should see the **PCF Ops Manager** VM instance and running. At this point, you can log into Ops
Manager as described in the next section, and follow the PAS installation logs from there.

9. Use the URLs displayed in the Outputs tab for the stack to view the resources that were created.

**Step 5. Test the Deployment**

After a successful deployment, you can access the following PCF resources.

**Access Ops Manager**

To access the PCF Ops Manager, open the following URL in a web browser:

```
https://opsman.pcfdomain
```

where `pcfdomain` is the domain name you specified in the Quick Start parameters; for example, `https://opsman.pcf.example.com`.

**Note** If you provided a self-signed certificate, you’ll see a warning in your web browser. To proceed, you’ll need to trust the self-signed certificate. For production environments, we recommend that you obtain a CA-verified certificate.

Log in with these credentials:

- User: `admin`
- Password: The password you specified for the **Ops Manager Admin Password** parameter during deployment
For more information about Ops Manager, see the [PCF documentation](#).

**Access Apps Manager**

To access the PAS Apps Manager, open the following URL in a web browser:

```
https://apps.sys.pcfdomain
```

where `pcfdomain` is the domain name you specified in the Quick Start parameters; for example, `https://apps.sys.pcf.example.com`.

**Note** If you provided a self-signed certificate, you’ll see a warning in your web browser. To proceed, you’ll need to trust the self-signed certificate. For production environments, we recommend that you obtain a CA-verified certificate.

Log in with these credentials:

- **User**: `admin` (note that this is different from the Ops Manager `admin` user name)
- **Password**: You can find the password in the Pivotal Application Service tile in Ops Manager. For instructions, see the [Pivotal documentation](#).

For more information about Apps Manager, see [Getting Started with Apps Manager](#) in the Pivotal documentation. For information about creating and managing users and roles in your PAS instance, see [Managing User Roles with Apps Manager](#) in the Pivotal documentation.
Log in from the Cloud Foundry CLI

You can also log in from the Cloud Foundry Command Line Interface (cf CLI). After you install the Cloud Foundry CLI on your workstation, run the following command to log in to your PAS instance:

```
cf login
```

If you provided a self signed certificate for your PAS instance, you’ll need to provide the `skip-ssl-validation` flag:

```
cf login --skip-ssl-validation
```

You’ll be prompted to enter the API endpoint, user name (email address), and password. For the API endpoint, enter `https://api.sys.pcfdomain`; for example:

```
cf login -a https://api.sys.pcf.example.com -u admin --skip-ssl-validation
```

For more information about the cf CLI, see the Pivotal documentation.

Download and Save the Private Key from the Bootstrap Instance

As part of the deployment, the Quick Start generates a key pair for all the instances that are part of the Pivotal Application Service. This key pair is different from the key pair you specify in step 4, during the deployment of the Quick Start. You can see the name of this key pair in the Amazon EC2 console as `stackname-pcf-keypair`. The private key of this key pair is saved on the Bootstrap instance, in the `/home/ubuntu/.ssh` folder. You may choose to download and save this private key, and then remove it from the Bootstrap instance.

Deleting the PAS Deployment

Delete the Main Stack

The Quick Start makes it easy to delete the entire PAS deployment. From the AWS CloudFormation console, delete the main stack (`Pivotal-Cloud-Foundry` by default, or the stack name you specified in the AWS CloudFormation console).

The deletion process is not reversible. Deleting the main stack will also delete any additional services (tiles) you may have installed from the Ops Manager.

If the stack deletion doesn’t complete successfully, you’ll need to manually delete all the AWS resources:
1. If you can still access Ops Manager, choose **Delete This Installation** in the **Admin, Settings, Advanced** menu. This is a long process that may take more than 30 minutes.

2. In the Amazon EC2 console, manually terminate the following resources:
   - All the remaining PCF instances
   - PCF security groups
   - PCF subnets
   - PCF load balancers

   At each step, try to delete the stack again and see if it works. If it does, you won’t need to execute the remaining steps.

**Delete the S3 Buckets**

You may need to manually delete S3 buckets after the stack is deleted. Look for S3 buckets with a name prefix that matches the Quick Start PCF stack name.

**Deploying Your First Application to PAS**

To deploy an application to PAS, follow the guidance in the [Cloud Foundry documentation](https://www.pivotal.io/docs/)

**Troubleshooting**

**Using CloudWatch Logs**

If the Quick Start deployment fails for some reason, the AWS CloudFormation stack will roll back. To debug the deployment, you can delete the stack and any leftover resources, and relaunch the Quick Start with the **Forward Log Output** configuration parameter set to **true**. This will forward the deployment logs to CloudWatch Logs. To review the logs for errors, open the Amazon CloudWatch console at [https://console.aws.amazon.com/cloudwatch/](https://console.aws.amazon.com/cloudwatch/), and in the navigation pane, choose **Logs**.

**Using Bootstrap Logs**

The Quick Start deployment creates a Bootstrap instance, which orchestrates the PAS installation. This instance also plays a key role if you delete the PAS instance by deleting the parent stack. If you run into any deployment issues, you might find it useful to view the logs in this instance. The FQDN for the Bootstrap instance is `bootstrap.pcfdomain`

To connect to the Bootstrap instance, use the private half of the key pair you specified in the template configuration in **step 4**, with the username `ubuntu`:

```
ssh -i keyfile ubuntu@bootstrap.pcfdomain
```
After you connect, you can view the Quick Start deployment logs at /var/log/cloud-init-output.log. (These are the same logs you’ll see in CloudWatch Logs.) We strongly discourage you from making any changes to the Bootstrap instance.

**Advanced Troubleshooting with BOSH**

PCF uses BOSH as the orchestration toolchain. You may run into a situation where you’ll need to do advanced troubleshooting with BOSH for your PCF instance. This requires running BOSH CLI commands from an instance that’s running on the same private network as the PCF instances, since these instances are not accessible over the internet. The Ops Manager instance has the BOSH CLI installed and is useful for this purpose. The default Ops Manager ingress configuration allows access to the Ops Manager over the internet. The FQDN for the Ops Manager instance is opsmanpcfdomain.

For advanced troubleshooting, connect to the Ops Manager instance through SSH with the user name ubuntu and the private half of the key pair you specified at the time of deployment:

```
ssh -i keyfile ubuntu@opsman.pcfdomain
```

From Ops Manager, you can initiate BOSH troubleshooting by following the instructions in the Pivotal documentation.

**Common Errors**

The following list identifies some of the common causes for deployment failures. Please make sure that you provide accurate values for all the parameters in the Quick Start template.

- Insufficient AWS quota in the AWS Region you are deploying to (see **step 1**)
- Incorrect domain (see **Domain** parameter in **step 4**)
- Bad SSL certificate (see **SSL Certificate ARN** in **step 4**)
- Incorrect Pivotal Network token (see **Pivotal Network Token** in **step 4**)

**Support**

If you run into any deployment issues that you’re unable to resolve with the provided information, contact Pivotal for support at pcf-quickstart@pivotal.io.
Additional Resources

AWS services

- Amazon EC2

- AWS CloudFormation
  https://aws.amazon.com/documentation/cloudformation/

- Amazon VPC
  https://aws.amazon.com/documentation/vpc/

Pivotal Cloud Foundry

- Documentation
  http://docs.pivotal.io/

- Pivotal Network (for downloading PCF components and services)
  http://network.pivotal.io/

- Manual installation instructions (for reference)
  https://docs.pivotal.io/pivotalcf/customizing/pcf-aws-manual-config.html

- Small Footprint PAS limitations (for reference)
  https://docs.pivotal.io/pivotalcf/2-4/customizing/small-footprint.html#limits

- Pivotal Cloud Foundry on AWS
  https://pivotal.io/partners/aws

Common data services

- MySQL
  https://docs.pivotal.io/p-mysql/

- RabbitMQ
  https://docs.pivotal.io/rabbitmq-cf/

- Redis
  https://docs.pivotal.io/redis/

- Pivotal Cloud Cache
  https://docs.pivotal.io/p-cloud-cache

Quick Start reference deployments

- AWS Quick Start home page
  https://aws.amazon.com/quickstart/
Send Us Feedback
You can visit our GitHub repository to download the templates and scripts for this Quick Start, to post your comments, and to share your customizations with others.

For general inquiries and feedback about Pivotal products, please contact Pivotal at pcf-quickstart@pivotal.io.

Document Revisions

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<tr>
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<tr>
<td><strong>March 2019</strong></td>
<td>Updated branding; added AWS Service Broker</td>
<td>Overview</td>
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<td><strong>February 2019</strong></td>
<td>Added new deployment option for Small Footprint PAS</td>
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