Bitbucket Data Center on the AWS Cloud

Quick Start Reference Deployment

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

amazon web services

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying Atlassian Bitbucket Data Center on the Amazon Web Services (AWS) Cloud. Quick Starts are automated reference deployments that use AWS CloudFormation templates to launch, configure, and run the AWS compute, network, storage, and other services required to deploy a specific workload on AWS.

Bitbucket Data Center is an on-premises Git repository management solution from Atlassian. It provides source code collaboration for enterprises that require high availability and performance at scale. Bitbucket Data Center provides the following features:

- **Clustering**: Enables you to run your Bitbucket instance on multiple nodes in the same data center. The cluster of nodes share the workload and provide scalable capacity, performance, and high availability. The cluster improves performance by distributing the workload across multiple dedicated machines. You can add nodes to your cluster to boost your capacity instantly, with no downtime. In the event of a system outage in one node, the remaining nodes can continue to handle incoming requests with little or no loss of availability.

- **Smart mirroring**: Lets you set up synchronized repository copies (*mirrors*) in geographically distributed locations, so that users can clone and fetch content faster. For more information about smart mirroring, see the Atlassian documentation.

- **Disaster recovery**: Helps you deploy an offsite disaster recovery system for business continuity even in the event of a complete system outage.

For more information about Bitbucket Data Center, see the Atlassian Bitbucket documentation.

This Quick Start is for users who want to deploy Bitbucket Data Center in a supported configuration in the AWS Cloud, following AWS best practices.

If you're interested in other solutions from Atlassian, see the AWS Quick Start for JIRA Software Data Center deployments.

Architecture

Deploying this Quick Start with the **default parameters** for a new VPC builds the following Bitbucket Data Center environment in the AWS Cloud.

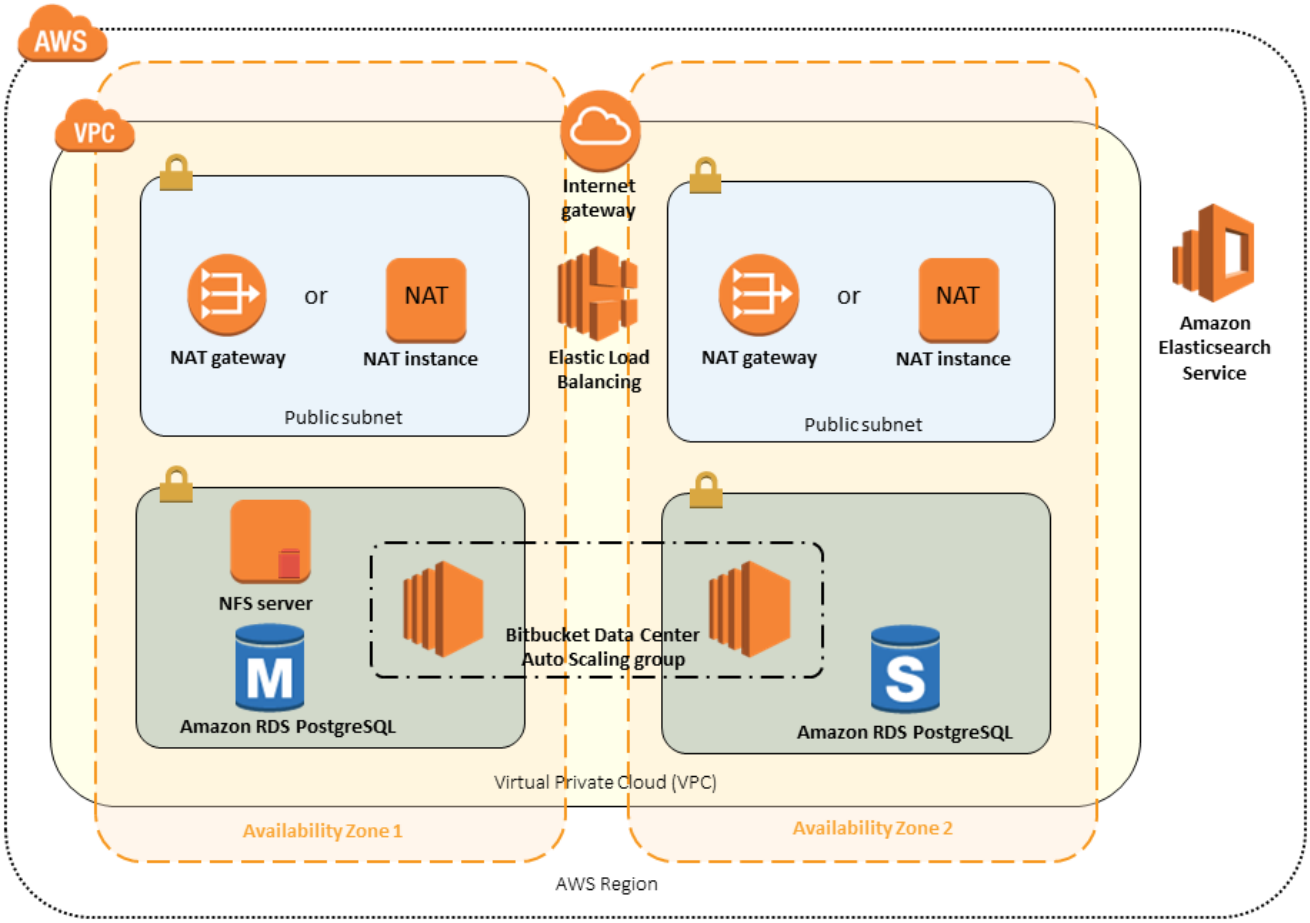

Figure 1: Bitbucket Data Center architecture on AWS

The Quick Start includes an AWS CloudFormation template that builds out AWS infrastructure components, and then bootstraps Bitbucket Data Center on Amazon Linux. This template builds a VPC with two subnets (private and public) and a NAT gateway (or a NAT instance in regions where NAT Gateway is not available), to enable instances in the private subnet to connect to the Internet. If you already have an AWS infrastructure, the Quick Start also provides an option for deploying Bitbucket Data Center into your existing VPC.

This Quick Start architecture includes the following components for the Bitbucket Data Center deployment:

- **Amazon RDS PostgreSQL**: Bitbucket Data Center requires a supported external database. Amazon Relational Database Service (Amazon RDS) PostgreSQL in a Multi-AZ configuration allows failover in the event the master node fails.
- **NFS server**: Bitbucket Data Center uses a shared file system to store the repositories in a common location that is accessible to multiple Bitbucket nodes. The Quick Start architecture implements the shared file system in an EC2 instance with an attached Amazon Elastic Block Store (Amazon EBS) volume. We recommend that you create regular snapshots of the EBS volume at a frequency that meets the recovery point objective (RPO) of your organization. If using a single EBS volume doesn't meet your availability and disaster recovery requirements, you should consider a highly available NFS implementation using AWS partner products.
- **Bitbucket Auto Scaling group**: The Bitbucket Data Center product is installed on EC2 instances in an Auto Scaling group. The instances are based on Amazon Linux and use an Atlassian-provided AMI. The scaling metric is CPU utilization.
- **Amazon Elasticsearch Service**: Bitbucket Data Center uses Elasticsearch 2.3 for indexing and searching. The Quick Start architecture uses the Amazon Elasticsearch Service (Amazon ES), which is a managed service that makes it easy to deploy, operate, and scale Elasticsearch in the AWS Cloud.

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 Getting Started with AWS.)

- Amazon VPC
- Amazon EC2
- Amazon EBS
- Amazon Elasticsearch Service
- PostgreSQL on Amazon RDS

Technical Requirements

This Quick Start requires an Atlassian account and a license to use Bitbucket Data Center.

Deployment Steps

This Quick Start provides two deployment options:

- **Deploy Bitbucket Data Center into a new VPC**. This option creates the VPC, subnets, NAT gateways, and security groups in your AWS account, and deploys Bitbucket Data Center into that new infrastructure.
- **Deploy Bitbucket Data Center into an existing VPC**. This option provisions Bitbucket Data Center in your existing VPC infrastructure.

The Quick Start provides separate templates for these options in step 3.

Step 1. Prepare an AWS Account

1. If you don't already have an AWS account, create one at http://aws.amazon.com by following the on-screen instructions.
2. Use the region selector in the navigation bar to choose the Amazon EC2 region where you want to deploy Bitbucket Data Center on AWS.
3. Create a key pair in your preferred region.
4. If necessary, request a service limit increase for the Amazon EC2 **c3.xlarge** instance type. You might need to do this if you already have an existing deployment that uses this instance type, and you think you might exceed the default limit with this reference deployment.

Step 2. Get a License Key for Bitbucket Data Center

1. Create an Atlassian ID at https://my.atlassian.com, if you already don't have one.
2. Obtain a Bitbucket Data Center license key from the Bitbucket product page. You can also obtain an evaluation license from the Bitbucket setup page, after you launch the Quick Start template.

Step 3. Launch the Quick Start

1. Use one of the following options to deploy the AWS CloudFormation template into your AWS account.

   The template is launched in the US West (Oregon) region by default. You can change the region by using the region selector in the navigation bar.

   Launch Quick Start (for new VPC) **Launch Quick Start (for existing VPC)**

Each stack takes less than 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. See the pricing pages for each AWS service you will be using or the AWS Simple Monthly Calculator for full details.

2. On the **Select Template** page, keep the default setting for the template URL, and then choose **Next**.
3. On the **Specify Details** page, review the parameters for the template. Enter values for the parameters that require your input. For all other parameters, you can customize the default settings provided by the template. When you finish reviewing and customizing the parameters, choose **Next**.

   In the following tables, parameters are listed and described separately for deploying Bitbucket Data Center into a new VPC or an existing VPC.

> **Note** The templates for the two scenarios share most, but not all, of the same parameters. For example, the template for an existing VPC prompts you for the VPC and private subnet IDs in your existing VPC environment. You can also download the templates and edit them to create your own parameters based on your specific deployment scenario.

- **Parameters for deploying Bitbucket Data Center into a new VPC**

  View the template for new VPC

  VPC network configuration:

Parameter label (name)	Default	Description
Availability Zones (AvailabilityZones)	*Requires input*	The list of Availability Zones to use for the subnets in the VPC. The Quick Start uses two Availability Zones from your list and preserves the logical order you specify.
VPC CIDR (VPCCIDR)	10.0.0.0/16	CIDR block for the VPC.
Private Subnet 1 CIDR (PrivateSubnet1CIDR)	10.0.0.0/19	CIDR block for the private subnet located in Availability Zone 1.
Private Subnet 2 CIDR (PrivateSubnet2CIDR)	10.0.32.0/19	CIDR block for the private subnet located in Availability Zone 2.

Parameter label (name)	Default	Description
Public Subnet 1 CIDR (PublicSubnet1CIDR)	10.0.128.0/20	CIDR block for the public (DMZ) subnet located in Availability Zone 1.
Public Subnet 2 CIDR (PublicSubnet2CIDR)	10.0.144.0/20	CIDR block for the public (DMZ) subnet located in Availability Zone 2.
Permitted IP range (AccessCIDR)	*Requires input*	The CIDR IP range that is permitted to access Bitbucket. We recommend that you set this value to a trusted IP range (for example, to restrict access to your corporate network). If you use 0.0.0.0/0, your Bitbucket instances will be open to public Internet access.
SSL certificate name (SSLCertificateName)	*Optional*	The name of your server certificate to use for HTTPS. Leave this parameter blank if you don't want to set up HTTPS at this time.

Amazon EC2 configuration:

Parameter label (name)	Default	Description
Key Name (KeyName)	*Requires input*	Public/private key pair, which allows you to connect securely to your instance after it launches. When you created an AWS account, this is the key pair you created in your preferred region.
NAT Instance Type (NATInstanceType)	t2.small	Amazon EC2 instance type for NAT instances. This parameter is used only if your selected AWS Region doesn't support NAT gateways.

Bitbucket setup:

Parameter label (name)	Default	Description
Version (BitbucketVersion)	*Requires input*	The version of Bitbucket to install. This Quick Start supports Bitbucket Data Center version 4.10.0 and later. For a list of versions, see the Atlassian documentation.

Cluster nodes:

Parameter label (name)	Default	Description
Bitbucket cluster node instance type (ClusterNodeInstanceType)	c3.xlarge	EC2 instance type for the Bitbucket Data Center nodes.
Minimum number of cluster nodes (ClusterNodeMin)	1	Minimum number of Bitbucket Data Center nodes in the Auto Scaling group.
Maximum number of cluster nodes (ClusterNodeMax)	2	Maximum number of Bitbucket Data Center nodes in the Auto Scaling group. When you first launch the Quick Start, leave the default value of 2 nodes unchanged. In step 4, after

Parameter label (name)	Default	Description
		configuring Bitbucket Data Center for multinode clustering, you can change this parameter setting to the desired number of cluster nodes.

File server:

Parameter label (name)	Default	Description
File server instance type (FileServerInstanceType)	m4.xlarge	EC2 instance type for the file server that is hosting the Bitbucket shared home directory.
Home directory size (HomeSize)	100	Storage size for the home directory, in GiB. Allowed range is 100-16,384.
Home volume type (HomeVolumeType)	Provisioned IOPS	Volume type for the home directory.
Home directory IOPS (HomeIops)	1000	IOPS for the home directory. This value is used only when the **Home volume type** parameter is set to Provisioned IOPS. Allowed range is 100-20,000. The ratio of IOPS to volume size must be 50 or less. For example, if you set this parameter to 5000 IOPS, the home directory size must be at least 100 GiB.

Database:

Parameter label (name)	Default	Description
RDS instance class (DBInstanceClass)	db.m4.large	EC2 instance type for the Amazon RDS database.
Master password (DBMasterUserPassword)	*Requires input*	Password for the master ("postgres") account. This password should be 8-128 alphanumeric characters.
Bitbucket database password (DBPassword)	*Requires input*	Password for the Bitbucket user ("atlbitbucket") account, with a maximum length of 128 alphanumeric characters. This setting isn't used if you've specified a database snapshot ID.
Database storage (DBStorage)	10	The storage size, in GiB, to allocate to the database. This value should be 100-6144, if you've selected Provisioned IOPS for the database storage type.
Database storage type (DBStorageType)	General Purpose (SSD)	Database storage type. For more information about storage types, see the AWS documentation.
RDS Provisioned IOPS (DBIops)	1000	IOPS for database storage. This value is used only when the **Database storage type** parameter is set to Provisioned IOPS. Allowed range is 1,000-30,000. The ratio of IOPS to allocated storage must be between 3 and 10.
Enable RDS Multi-AZ deployment (DBMultiAZ)	true	If **true**, the Quick Start deploys the Bitbucket instances in two Availability Zones for high availability. If high availability isn't a concern, you can set this parameter to **false**.

Elasticsearch:

Parameter label (name)	Default	Description
Elasticsearch instance type (ElasticsearchInstanceType)	m3.xlarge.elasticsearch	EC2 instance type for the Amazon Elasticsearch service to run on.

Advanced (optional):

Parameter label (name)	Default	Description
Database snapshot ID to restore (DBSnapshotId)	*Optional*	Amazon RDS snapshot ID of an existing database backup to restore. This parameter must be used with the **Home volume snapshot ID to restore** parameter. Leave this value blank for a new instance.
Home volume snapshot ID to restore (HomeVolumeSnapshotId)	*Optional*	Amazon EBS snapshot ID of an existing database backup to restore as the home directory. This parameter must be used with the **Database snapshot ID to restore** parameter. Leave this value blank for a new instance.
Bitbucket properties (BitbucketProperties)	*Optional*	A comma-separated list of Bitbucket properties in the format key1=value1, key2=value2, etc. For more information, see Bitbucket server config properties in the Atlassian documentation.
Catalina options (CatalinaOpts)	*Optional*	Java options that are passed to the JVM that runs Bitbucket.
Delete Home on termination (HomeDeleteOnTermination)	true	Keep the default setting of **true** to delete the Bitbucket home directory when the instance is terminated. If **true**, you must back up your data before terminating your instance. Set to **false** to keep the home directory volume upon termination.
Bitbucket primary database (DBMaster)	*Optional*	Database ARN of the Amazon RDS instance to replicate. Setting this parameter will bring up Bitbucket as a disaster recovery standby with an Amazon RDS read replica database.
Start the collectd service (StartCollectd)	false	Set this parameter to **true** to enable monitoring with the collectd.conf configuration file.

AWS Quick Start configuration:

Parameter label (name)	Default	Description
Quick Start S3 Bucket Name (QSS3BucketName)	quickstart-reference	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.

Parameter label (name)	Default	Description
Quick Start S3 Key Prefix (QSS3KeyPrefix)	atlassian/bitbucket /latest	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, but should not start or end with a forward slash (which is automatically added).

- **Parameters for deploying Bitbucket Data Center into an existing VPC**

View the template for existing VPC

Bitbucket setup:

Parameter label (name)	Default	Description
Version (BitbucketVersion)	*Requires input*	The version of Bitbucket to install. Bitbucket version 4.10.0 and later are supported. For a list of versions, see the Atlassian documentation.

Cluster nodes:

Parameter label (name)	Default	Description
Bitbucket cluster node instance type (ClusterNodeInstanceType)	c3.xlarge	EC2 instance type for the Bitbucket Data Center nodes.
Minimum number of cluster nodes (ClusterNodeMin)	1	Minimum number of Bitbucket Data Center nodes in the Auto Scaling group.
Maximum number of cluster nodes (ClusterNodeMax)	2	Maximum number of Bitbucket Data Center nodes in the Auto Scaling group. When you first launch the Quick Start, leave the default value of 2 nodes unchanged. In step 4, after configuring Bitbucket Data Center for multinode clustering, you can change this parameter setting to the desired number of cluster nodes.

File server:

Parameter label (name)	Default	Description
File server instance type (FileServerInstanceType)	m4.xlarge	EC2 instance type for the file server that is hosting the Bitbucket shared home directory.
Home directory size (HomeSize)	100	Storage size for the home directory, in GiB. Allowed range is 100-16,384.

Parameter label (name)	Default	Description
Home directory volume type (HomeVolumeType)	Provisioned IOPS	Volume type for the home directory.
Home directory IOPS (HomeIops)	1000	IOPS for the home directory. This value is used only when the **Home volume type** parameter is set to Provisioned IOPS. Allowed range is 100-20,000. The ratio of IOPS to volume size must be 50 or less. For example, if you set this parameter to 5000 IOPS, the home directory size must be at least 100 GiB.

Database:

Parameter label (name)	Default	Description
RDS instance class (DBInstanceClass)	db.m4.large	EC2 instance type for the Amazon RDS database.
Master password (DBMasterUserPassword)	*Requires input*	Password for the master ("postgres") account. This password should be 8-128 alphanumeric characters.
Bitbucket database password (DBPassword)	*Requires input*	Password for the Bitbucket user ("atlbitbucket") account, with a maximum length of 128 alphanumeric characters. This setting isn't used if you've specified a database snapshot ID.
Database storage (DBStorage)	10	The storage size, in GiB, to allocate to the database. This value should be 100-6144, if you've selected Provisioned IOPS for the database storage type.
Database storage type (DBStorageType)	General Purpose (SSD)	Database storage type. For more information about storage types, see the AWS documentation.
RDS Provisioned IOPS (DBIops)	1000	IOPS for database storage. This value is used only when the **Database storage type** parameter is set to Provisioned IOPS. Allowed range is 1,000-30,000. The ratio of IOPS to allocated storage must be between 3 and 10.
Enable RDS Multi-AZ deployment (DBMultiAZ)	true	If **true**, the Quick Start deploys the Bitbucket instances in two Availability Zones for high availability. If high availability isn't a concern, you can set this parameter to **false**.

Elasticsearch:

Parameter label (name)	Default	Description
Elasticsearch instance type (ElasticsearchInstanceType)	m3.xlarge.elasticsearch	EC2 instance type for the Amazon Elasticsearch service to run on.

Networking:

Parameter label (name)	Default	Description
VPC (VPC)	*Requires input*	ID of your existing VPC where you want to deploy Bitbucket Data Center (e.g., vpc-0343606e).
External subnets (ExternalSubnets)	*Requires input*	Two or more subnets within the selected VPC where your user-facing load balancer will be deployed.
Internal subnets (InternalSubnets)	*Requires input*	Two or more subnets within the selected VPC where your cluster nodes and other internal infrastructure will be deployed. If you want to deploy the entire stack into the same subnets, you can choose the same subnets for the **External Subnets** and **Internal Subnets** parameters.
Assign public IP (AssociatePublicIpAddress)	true	Controls whether the EC2 instances are assigned a public IP address.
Permitted IP range (CidrBlock)	*Requires input*	The CIDR IP range that is permitted to access Bitbucket. We recommend that you set this value to a trusted IP range (for example, to restrict access to your corporate network). If you use 0.0.0.0/0, your Bitbucket instances will be open to public Internet access.
Key Name (KeyName)	*Requires input*	Public/private key pair, which allows you to connect securely to your instance after it launches. When you created an AWS account, this is the key pair you created in your preferred region.
SSL certificate name (SSLCertificateName)	*Optional*	The name of your server certificate to use for HTTPS. Leave this parameter blank if you don't want to set up HTTPS at this time.

Advanced (Optional):

Parameter label (name)	Default	Description
Database snapshot ID to restore (DBSnapshotId)	*Optional*	Amazon RDS snapshot ID of an existing database backup to restore. This parameter must be used with the **Home volume snapshot ID to restore** parameter. Leave this value blank for a new instance.
Home volume snapshot ID to restore (HomeVolumeSnapshotId)	*Optional*	Amazon EBS snapshot ID of an existing database backup to restore as the home directory. This parameter must be used with the **Database snapshot ID to restore** parameter. Leave this value blank for a new instance.
Bitbucket properties (BitbucketProperties)	*Optional*	A comma-separated list of Bitbucket properties in the format key1=value1, key2=value2, etc. For more information, see Bitbucket server config properties in the Atlassian documentation.
Catalina options (CatalinaOpts)	*Optional*	Java options that are passed to the JVM that runs Bitbucket.

Parameter label (name)	Default	Description
Delete Home on termination (HomeDeleteOnTermination)	true	Keep the default setting of **true** to delete the home directory when the instance is terminated. If **true**, you must back up your data before terminating your instance. Set to **false** to keep the home directory volume upon termination.
Bitbucket primary database (DBMaster)	*Optional*	Database ARN of the Amazon RDS instance to replicate. Setting this parameter will bring up Bitbucket as a disaster recovery standby with an Amazon RDS read replica database.
Start the collectd service (StartCollectd)	false	Set this parameter to **true** to enable monitoring with the collectd.conf configuration file.

4. 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**.
5. 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.
6. Choose **Create** to deploy the stack.
7. Monitor the status of the stack. When the status is **CREATE_COMPLETE**, the deployment is complete.
8. You can use the URL displayed in the **Outputs** tab for the stack to view the resources that were created.

Step 4. Configure Bitbucket Data Center

When you launch the Quick Start, it deploys a single Bitbucket node (Auto Scaling group of min=1 and max=2). If you want this node to gain the ability to cluster with other Bitbucket nodes, you need to sign up for a Bitbucket Data Center license.

1. Choose the URL displayed in the **Outputs** tab to go to the Bitbucket setup screen.
2. On the **Licensing and Settings** page, enter a title for your Bitbucket deployment. Leave the base URL unchanged, and choose the appropriate licensing option. If you don't have a valid license for Bitbucket Data Center, sign up for an evaluation license.

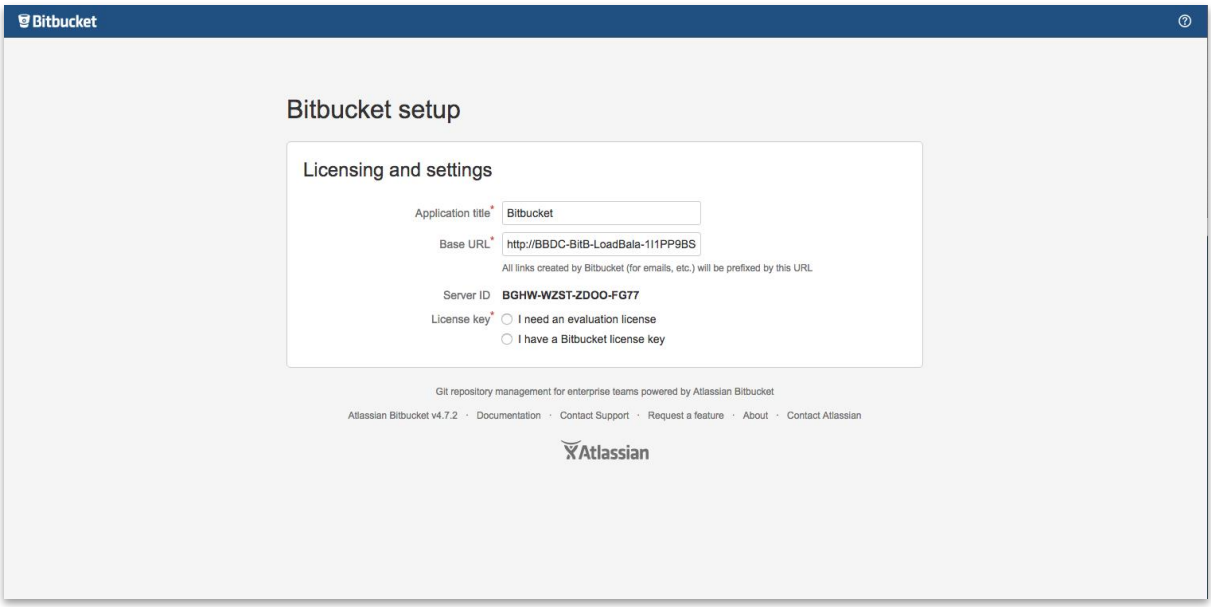

Figure 2: Bitbucket licensing and settings

3. To set up Bitbucket Data Center, you need to create an Administrator account and password. The Administrator account has full access to all data in Bitbucket, so we highly recommend that you choose a strong password for this account. Enter the Administrator's user details in the setup screen illustrated in Figure 3, and choose **Go to Bitbucket**.

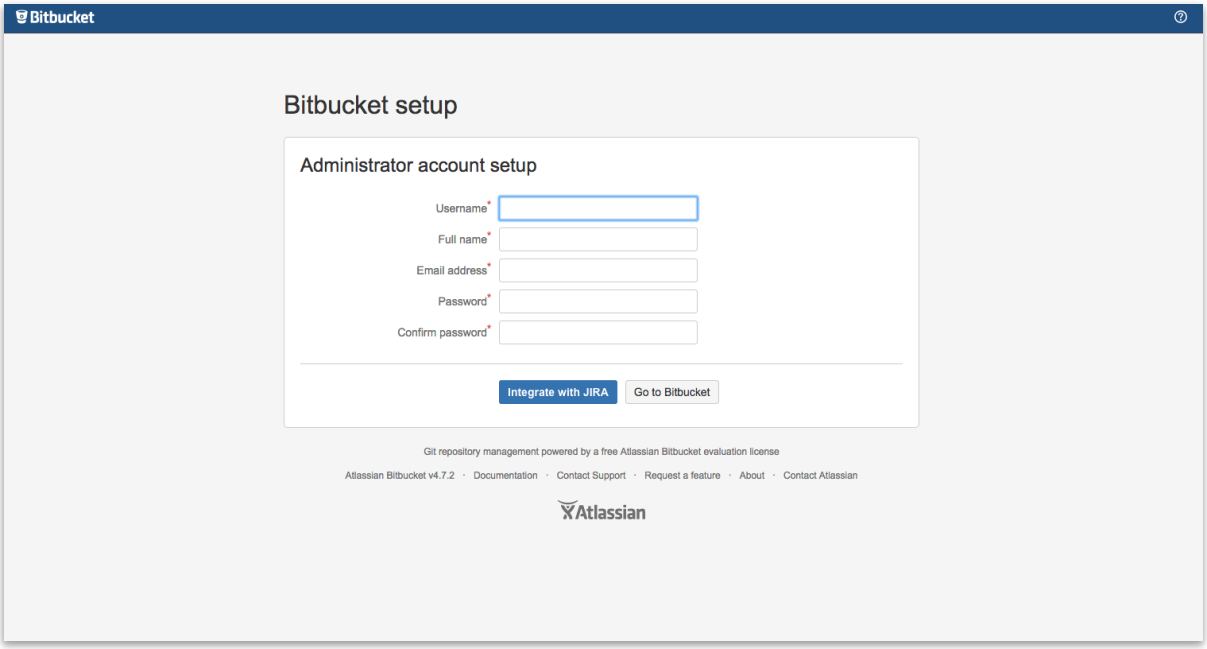

Figure 3: Bitbucket setup screen

4. Log in with the user name and credentials you created in the previous step.

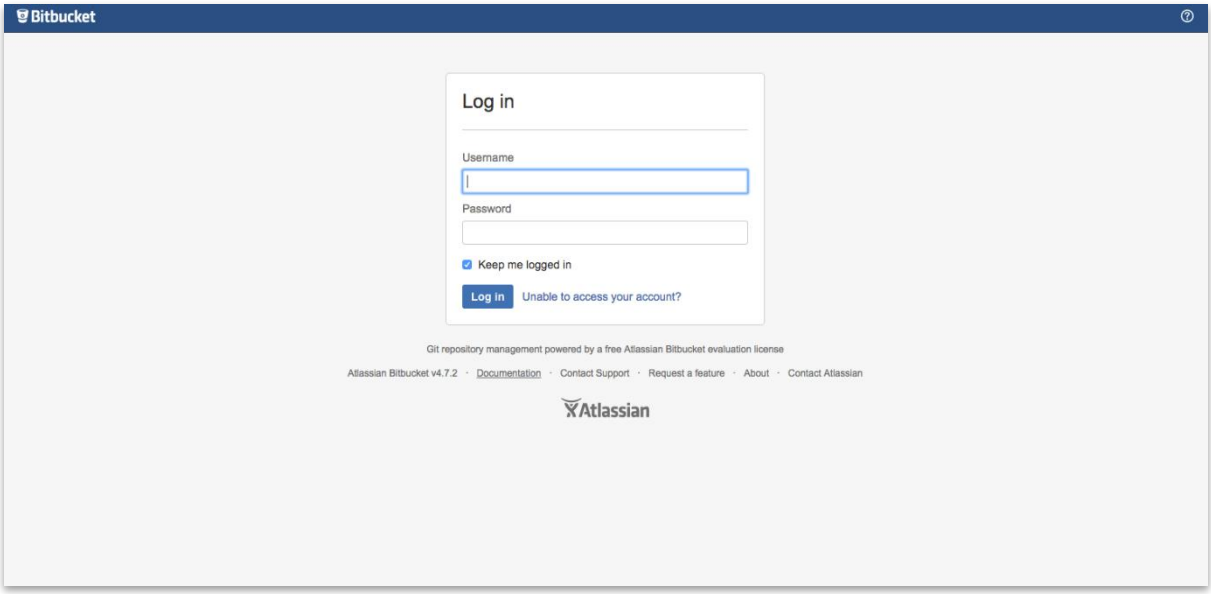

Figure 4: Logging in to Bitbucket Data Center

5. Choose **Settings** (the gear icon in the upper right), and then choose **Clustering**. You should see a page similar to that illustrated in Figure 5, which shows that the node is ready for clustering.

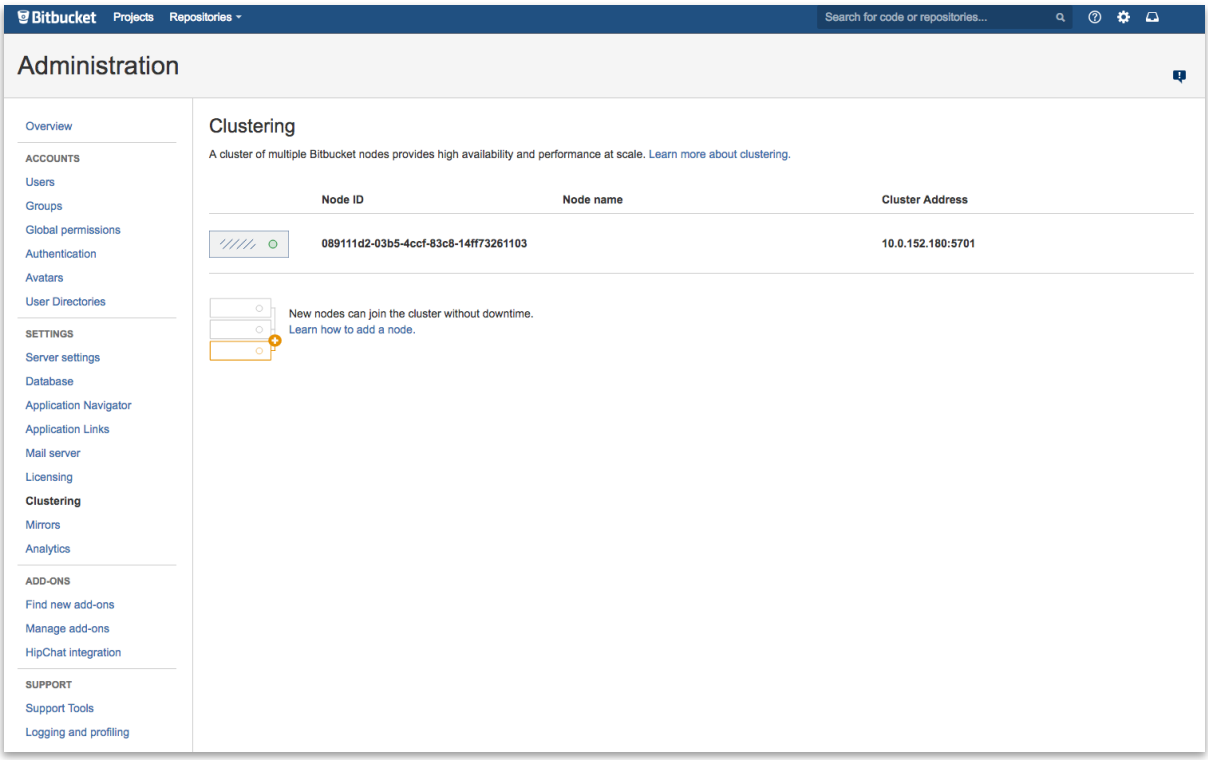

Figure 5: Standalone node is ready for clustering

Your Bitbucket Data Center deployment is now in a state where you can add nodes that will automatically cluster with your existing node.

Step 5: Add Nodes to the Cluster

1. Sign in to the AWS Management Console, use the region selector in the navigation bar to choose the AWS Region for your deployment, and open the AWS CloudFormation console at https://console.aws.amazon.com/cloudformation/.
2. Choose the Bitbucket Data Center template. From the **Actions** list, choose **Update Stack**.
3. On the **Select Template** page, leave **Use current template** selected, and then choose **Next**.
4. On the **Specify Details** page, in the **Cluster nodes** section of **Parameters**, enter the desired value for **Maximum number of cluster nodes**, and click through to update the stack.
5. After the stack has finished updating, confirm that the additional nodes have formed a cluster by viewing the **Clustering** page in Bitbucket Data Center (illustrated in Figure 6).

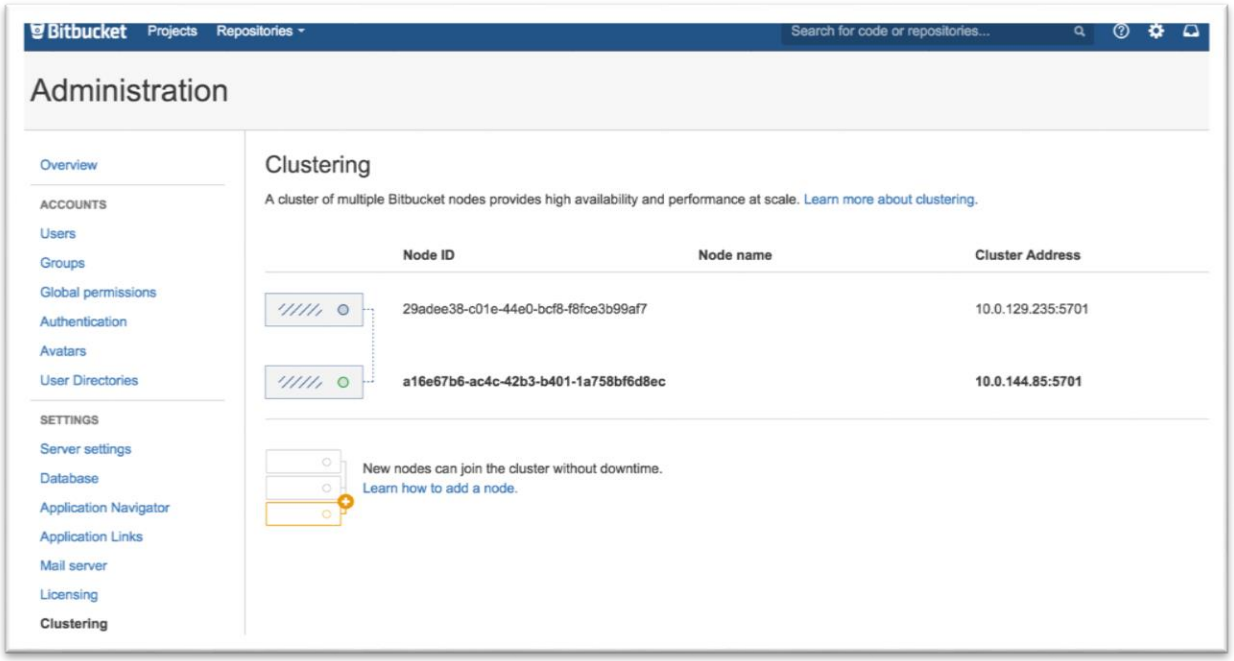

Figure 6: Two nodes in a clustered configuration

FAQ

Q. I encountered a CREATE_FAILED error when I launched the Quick Start. What should I do?

A. If AWS CloudFormation fails to create the stack, we recommend that you relaunch the template with **Rollback on failure** set to **No**. (This setting is under **Advanced** in the AWS CloudFormation console, **Options** page.) With this setting, the stack's state will be retained and the instance will be left running, so you can troubleshoot the issue. (You'll want to look at the log files in `/var/log/atl.log` and `/var/log/cfn-init.log`.)

> **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.

For additional information, see Troubleshooting AWS CloudFormation on the AWS website or contact us on the AWS Quick Start Discussion Forum.

Additional Resources

AWS services

- AWS CloudFormation
  http://aws.amazon.com/documentation/cloudformation/
- Amazon EBS
  http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AmazonEBS.html
- Amazon EC2
  https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html
- Amazon VPC
  http://aws.amazon.com/documentation/vpc/

Atlassian documentation

- Bitbucket Data Center
  https://confluence.atlassian.com/display/BitbucketServer/Clustering+with+Bitbucket+Data+Center

Quick Start reference deployments

- JIRA Software Data Center on the AWS Cloud: Quick Start Reference Deployment
  https://s3.amazonaws.com/quickstart-reference/atlassian/jira/latest/doc/jira-software-data-center-on-the-aws-cloud.pdf
- AWS Quick Start home page
  https://aws.amazon.com/quickstart/
- Community Quick Starts
  https://aws.amazon.com/quickstart/community/

Send Us Feedback

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

You can visit our GitHub repository to download the templates and scripts for this Quick Start, and to share your customizations with others.

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