

iBASEt Solumina on the AWS Cloud

Quick Start Reference Deployment

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Visit our [GitHub repository](#) for source files and to post feedback, report bugs, or submit feature ideas for this Quick Start.

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

[Quick Starts](#) are automated reference deployments that use AWS CloudFormation templates to deploy key technologies on AWS, following AWS best practices.

Overview

This Quick Start reference deployment guide provides step-by-step instructions for deploying iBASEt Solumina Manufacturing Execution System (MES) on the AWS Cloud.

Solumina on AWS

Solumina is an MES software suite that manages work and quality processes for the manufacturing maintenance, repair, and overhaul of engineered products. iBASEt software for MES improves manufacturing productivity, quality, and compliance by providing transparency to operators, supervisors, and plant managers. It also allows operators to spend more time being productive and less time looking for work instructions, amending them, and waiting for corrections.

Cost and licenses

This Quick Start requires a Solumina license. To use the Quick Start in your evaluation of the software or in a production environment, contact [iBASEt sales](#). After deploying the software, use MES to register your license.

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.

The AWS CloudFormation template for this Quick Start includes configuration parameters that you can customize. Some of these settings, such as instance type, affect the cost of deployment. For cost estimates, see the [pricing pages](#) for each AWS service you will use. Prices are subject to change.

Tip After you deploy the Quick Start, we recommend that you enable the [AWS Cost and Usage Report](#) to track costs associated with the Quick Start. This report delivers billing metrics to an Amazon Simple Storage Service (Amazon S3) bucket in your account. It provides cost estimates based on usage throughout each month and finalizes the data at the end of the month. For more information about the report, see the [AWS documentation](#).

Architecture

Deploying this Quick Start for a new Amazon Virtual Private Cloud (Amazon VPC) with **default parameters** builds the following Solumina environment in the AWS Cloud.

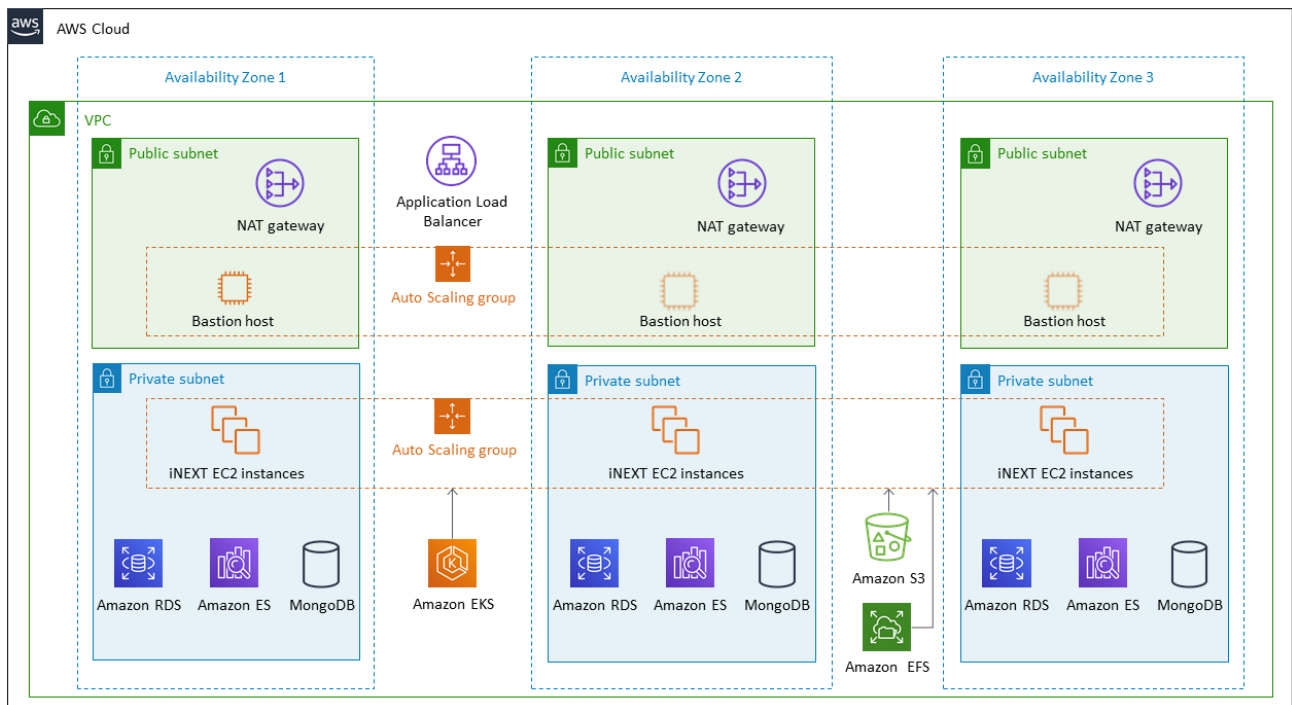


Figure 1: Quick Start architecture for Solumina on AWS

This Quick Start sets up the following:

- A highly available architecture that spans three Availability Zones.*
- A VPC configured with public and private subnets, according to AWS best practices, to provide you with your own virtual network.*
- In the public subnets:
 - Managed network address translation (NAT) gateways to allow outbound internet access for resources in the private subnets.*

- A Linux bastion host in an Auto Scaling group to allow inbound Secure Shell (SSH) access to Amazon Elastic Compute Cloud (Amazon EC2) instances in public and private subnets.*
- In the private subnets, installed as highly available clusters:
 - The Solumina proprietary software.
 - Amazon Elasticsearch Service (Amazon ES).
 - A MongoDB resource.
 - Amazon Relational Database Service (Amazon RDS).
- An Application Load Balancer to route traffic to the Solumina web application over HTTPS.
- Amazon Elastic Kubernetes Service (Amazon EKS).
- An Amazon S3 bucket for storing Quick Start assets.
- Amazon Elastic File System (Amazon EFS) to provide on-demand scaling and management of AWS Cloud services and resources.

* The template that deploys the Quick Start into an existing VPC skips the components marked by asterisks and prompts you for your existing VPC configuration.

Planning the deployment

Specialized knowledge

This deployment guide also requires a moderate level of familiarity with AWS services. If you're new to AWS, visit the [Getting Started Resource Center](#) and the [AWS Training and Certification website](#) for materials and programs that can help you develop the skills to design, deploy, and operate your infrastructure and applications on the AWS Cloud.

AWS account

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

Your AWS account is automatically signed up for all AWS services. You are charged only for the services you use.

Technical requirements

Before you launch the Quick Start, your account must be configured as specified in the following table. Otherwise, deployment might fail.

The Quick Start is entirely prompt-based. However, your account must be able to provision the following AWS services:

- Amazon VPC
- Amazon EC2
- Amazon ES, Logstash, and Kibana (ELK) stack
- Amazon RDS (SQL Server is currently supported)
- Amazon S3
- Amazon EFS

[Regions](#)

This deployment includes Amazon EFS, which is not currently supported in all AWS Regions. For a current list of supported Regions, see [AWS Service Endpoints](#) in the AWS documentation.

[Key pair](#)

Ensure that at least one Amazon EC2 key pair exists in your AWS account in the Region where you are planning to deploy the Quick Start. Make note of the key pair name because you will be prompted for this information during deployment. To create a key pair, follow the [instructions in the AWS documentation](#).

If you are deploying this Quick Start for testing purposes, we recommend that you create a new key pair instead of using an existing key pair.

[IAM permissions](#)

To deploy the Quick Start, sign in to the AWS Management Console with AWS Identity and Access Management (IAM) permissions for the resources and actions the templates will deploy. The *AdministratorAccess* managed policy within IAM provides sufficient permissions, but your organization may choose to use a stricter custom policy.

Deployment options

This Quick Start provides two deployment options:

- **Deploy Solumina into a new VPC (end-to-end deployment).** This option builds a new AWS environment comprising the VPC, subnets, NAT gateways, security groups, bastion hosts, and other infrastructure components. It then deploys Solumina into this new VPC.
- **Deploy Solumina into an existing VPC.** This option provisions Solumina within your existing AWS infrastructure.

The Quick Start lets you configure Classless Inter-Domain Routing (CIDR) blocks, instance types, and Solumina settings, as discussed later in this guide.

The Quick Start installs the latest version of the Solumina environment on an Amazon EC2 cluster running CentOS 7 (x86_64) with Hardware Virtual Machine (HVM) using Amazon EKS for container orchestration.

Deployment steps

Step 1. Sign in to your AWS account

1. Sign in to your account at <https://aws.amazon.com> with your IAM user role that has the necessary permissions. For details, see [Planning the deployment](#) earlier in this guide.
2. Ensure that your AWS account is configured correctly, as discussed in the [Technical requirements](#) section.

Step 2. Launch the Quick Start

Note The instructions in this section reflect the older version of the AWS CloudFormation console. If you're using the redesigned console, some of the user-interface elements might be different.

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. If you are using CentOS, subscribe to the CentOS Amazon Machine Image (AMI) in [AWS Marketplace](#).
2. Sign in to your AWS account, and choose one of the following options to launch the AWS CloudFormation template. For help with choosing an option, see [deployment options](#) earlier in this guide.



[Deploy Solumina into a new VPC on AWS](#)

[Deploy Solumina into an existing VPC on AWS](#)

Important If you're deploying Solumina into an existing VPC, ensure that your VPC has three private subnets in different Availability Zones for the workload instances, and that the subnets aren't shared. This Quick Start doesn't support [shared subnets](#). These subnets require [NAT gateways](#) in their routing tables to allow the instances to download packages and software without exposing them to the internet. You will also need the domain name option configured in the Dynamic Host Configuration Protocol (DHCP) options as explained in the [Amazon VPC documentation](#). You will be prompted for your VPC settings when you launch the Quick Start.

Each deployment takes about 1.5–2 hours to complete.

3. Check the AWS Region that is displayed in the upper-right corner of the navigation bar, and change it if necessary. This is where the network infrastructure for Solumina will be built. The template is launched in the US East (Ohio) Region by default.

Note This deployment includes Amazon EFS, which is not currently supported in all AWS Regions. For a current list of supported Regions, see the [AWS Service Endpoints](#) webpage.

4. On the **Select Template** page, keep the default setting for the template URL, and then choose **Next**.
5. 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.

In the following tables, parameters are listed by category and described separately for the two deployment options:

- [Parameters for deploying Solumina into a new VPC](#)
- [Parameters for deploying Solumina into an existing VPC](#)

When you finish reviewing and customizing the parameters, choose **Next**.

OPTION 1: PARAMETERS FOR DEPLOYING SOLUMINA INTO A NEW VPC[View template](#)*AWS environment and Solumina configuration:*

Parameter label (name)	Default	Description
Availability Zones (AvailabilityZones)	<i>Requires input</i>	List of Availability Zones to use for the subnets in the VPC. Three Availability Zones are used for this deployment, and the logical order of your selections is preserved.
VPC CIDR (VPCCIDR)	192.168.10.0/24	CIDR block for the VPC.
Private subnet 1 CIDR (PrivateSubnet1CIDR)	192.168.10.0/26	CIDR block for the private subnet located in Availability Zone 1.
Private subnet 2 CIDR (PrivateSubnet2CIDR)	192.168.10.64/26	CIDR block for the private subnet located in Availability Zone 2.
Private subnet 3 CIDR (PrivateSubnet3CIDR)	192.168.10.128/26	CIDR block for the private subnet located in Availability Zone 3.
Public subnet 1 CIDR (PublicSubnet2CIDR)	192.168.10.192/28	CIDR block for the public (DMZ) subnet 1 located in Availability Zone 1.
Public subnet 2 CIDR (PublicSubnet2CIDR)	192.168.10.208/28	CIDR block for the public (DMZ) subnet 2 located in Availability Zone 2.
Public subnet 3 CIDR (PublicSubnet2CIDR)	192.168.10.224/28	CIDR block for the public (DMZ) subnet 3 located in Availability Zone 3.
Allocated storage to DB (AllocatedStorage)	100	Enter the number of gigabytes for RDS, between 100 GiB and 5,120 GiB (5 TiB).
Cluster replica set count (ClusterReplicaSetCount)	3	Number of replica set members. Choose 1 or 3.
DB instance class (DBInstanceClass)	db.m4.large	Name of the compute and memory capacity class of the database instance.
SQL Server DB password (DatabasePassword)	<i>Requires input</i>	Database administrator account password.
ELK stack version (ElasticsearchVersion)	6.7	User-defined Elasticsearch version.
ELK instance type (ELKInstanceType)	r5.large.elasticsearch	Instance type for ELK stack.
IOPS (Iops)	100	IOPS of EBS volume when io1 type is chosen. It is otherwise ignored.
SSH key name (KeyPairName)	<i>Requires input</i>	Name of an existing key pair, which allows you to securely connect to your instance after it launches.
Kubernetes version (KubernetesVersion)	1.12	Kubernetes control plane version.

Parameter label (name)	Default	Description
MongoDB password (MongoDBAdminPassword)	<i>Requires input</i>	Enter a MongoDB password that is between 8 and 32 characters.
MongoDB version (MongoDBVersion)	4.0	MongoDB version.
MongoDB node instance type (MongoNodeInstanceType)	m4.large	Amazon EC2 instance type for the MongoDB nodes.
Node group name (NodeGroupName)	ec2group	Name of the EKS node group.
Node instance type (NodeInstanceType)	t3.xlarge	Type of EC2 instance for the node instances.
Node volume size (NodeVolumeSize)	20	Size of the node's root EBS volumes.
Number of nodes (NumberOfNodes)	3	Number of Amazon EKS node instances. The default is one for each of the three Availability Zones.
AMI ID for EC2 to run postscripts (PostRDSWindowsAmiId)	<i>Requires input</i>	AMI ID for Windows Server (Windows_Server-2019-English-Full-SQL_2017_Standard-2019.06.12).
Quick Start S3 bucket name (QS3BucketName)	aws-quickstart	S3 bucket name for Quick Start assets. This string can include numbers, lowercase letters, uppercase letters, and hyphens (-), but it cannot start or end with a hyphen.
Quick Start S3 key prefix (QS3KeyPrefix)	quickstart-ibaset-solumina/	Amazon S3 key name prefix for the Quick Start assets. The Quick Start key prefix can include numbers, lowercase and uppercase letters, hyphens (-), periods (.), and forward slashes (/).
JDBC driver bucket name (JDBCdriverBucketName)	<i>Requires input</i>	Name of Java Database Connectivity (JDBC) driver storage bucket.
JDBC driver bucket key prefix (JDBCdriverBucketKeyPrefix)	<i>Requires input</i>	Name of JDBC driver storage bucket key prefix.
Unique random string (RandomString)	<i>Requires input</i>	String to create unique resource names. This is added as a suffix to the resource name.
Allowed external access CIDR (RemoteAccessCIDR)	192.30.183.0/24	CIDR IP range that is permitted to access the instances. We recommend that you set this value to a trusted IP range.
Replica shard index (ReplicaShardIndex)	0	Shard index of this replica set.
SQL Server instance name (SqlServerInstanceName)	SqlRdsDB	RDS SQL Server instance name.
SQL Server version (SqlServerVersion)	SQLServer2016	Enter the SQL Server version. SQL Server 2012 and 2016 are supported.

Parameter label (name)	Default	Description
Volume size (VolumeSize)	400	EBS volume size (gigabytes of data) to be attached to a node.
Volume type (VolumeType)	gp2	EBS volume type (gigabytes of data) to be attached to a node [io1, gp2].

Note We recommend that you keep the default settings for the following two parameters, unless you are customizing Quick Start templates for your own deployment projects. Changing the settings of these parameters automatically updates code references to point to a new Quick Start location. For additional details, see the [AWS Quick Start Contributor's Guide](#).

OPTION 2: PARAMETERS FOR DEPLOYING SOLUMINA INTO AN EXISTING VPC

[View template](#)

AWS Environment and Solumina configuration:

Parameter label (name)	Default	Description
Availability Zones (AvailabilityZones)	<i>Requires input</i>	List of Availability Zones to use for the subnets in the VPC. Three Availability Zones are used for this deployment, and the logical order of your selections is preserved.
VPC ID (VPCID)	<i>Requires input</i>	ID of the existing VPC.
VPC CIDR (VPCCIDR)	<i>Requires input</i>	CIDR block for the existing VPC.
Private subnet 1 ID (PrivateSubnet1ID)	<i>Requires input</i>	CIDR block for the existing private subnet located in Availability Zone 1.
Private subnet 2 ID (PrivateSubnet2ID)	<i>Requires input</i>	CIDR block for the existing private subnet located in Availability Zone 2.
Private subnet 3 ID (PrivateSubnet3ID)	<i>Requires input</i>	CIDR block for the existing private subnet located in Availability Zone 3.
Public subnet 1 ID (PublicSubnet1ID)	<i>Requires input</i>	CIDR block for the existing public subnet located in Availability Zone 1.
Public subnet 2 ID (PublicSubnet2ID)	<i>Requires input</i>	CIDR block for the existing public subnet located in Availability Zone 2.
Public subnet 3 ID (PublicSubnet3ID)	<i>Requires input</i>	CIDR block for the existing public subnet located in Availability Zone 3.
Allocated storage to DB (AllocatedStorage)	100	Enter the number of gigabytes for RDS, between 100 GiB and 5,120 GiB (5 TiB).

Parameter label (name)	Default	Description
Cluster replica set count (ClusterReplicaSetCount)	3	Number of replica set members. Choose 1 or 3.
DB instance class (DBInstanceClass)	db.m4.large	Name of the compute and memory capacity class of the database instance.
ELK stack version (ElasticsearchVersion)	6.7	User-defined Elasticsearch version.
ELK instance type (ELKInstanceType)	r5.large.elasticsearch	Instance type for ELK stack.
IOPS (Iops)	100	IOPS of EBS volume when io1 type is chosen. It is otherwise ignored.
SSH key name (KeyPairName)	<i>Requires input</i>	Name of an existing key pair that allows you to securely connect to your instance after it launches.
Kubernetes version (KubernetesVersion)	1.12	Kubernetes control plane version.
MongoDB password (MongoDBAdminPassword)	<i>Requires input</i>	Enter a MongoDB password that is between 8 and 32 characters.
MongoDB version (MongoDBVersion)	4.0	Version of MongoDB.
MongoDB node instance type (MongoNodeInstanceType)	m4.large	Amazon EC2 instance type for the MongoDB nodes.
Node group name (NodeGroupName)	ec2group	Name of the EKS node group.
Nodes instance type (NodeInstanceType)	t3.xlarge	Type of EC2 instance for the node instances.
Node volume size (NodeVolumeSize)	20	Size of the node's root EBS volumes.
Number of nodes (NumberOfNodes)	3	Number of Amazon EKS node instances. The default is 1 for each of the three Availability Zones.
AMI ID for EC2 to run postscripts (PostRDSWindowsAmiId)	<i>Requires input</i>	AMI ID of Windows_Server-2019-English-Full-SQL_2017_Standard-2019.06.12.
Quick Start S3 bucket name (QSS3BucketName)	aws-quickstart	S3 bucket name for the Quick Start assets. This string can include numbers, lowercase and uppercase letters, and hyphens (-), but it cannot start or end with a hyphen.
Quick Start S3 key prefix (QSS3KeyPrefix)	quickstart-ibaset-solumina/	S3 key name prefix for the Quick Start assets. The Quick Start key prefix can include numbers, lowercase and uppercase letters,

Parameter label (name)	Default	Description
		hyphens (-), periods (.), and forward slashes (/).
JDBC driver bucket name (JDBCDriverBucketName)	<i>Requires input</i>	Name of JDBC driver storage bucket.
JDBC driver bucket key prefix (JDBCDriverBucketKeyPrefix)	<i>Requires input</i>	Name of JDBC driver storage bucket key prefix.
Unique random string (RandomString)	<i>Requires input</i>	String to create unique resource names. This is added as a suffix to the resource name.
Replica shard index (ReplicaShardIndex)	0	Shard index of the replica set.
SQL Server instance name (SqlServerInstanceName)	SqlRdsDB	RDS SQL Server instance name.
SQL Server DB password (DatabasePassword)	<i>Requires input</i>	The database administrator password.
SQL Server version (SqlServerVersion)	SqlServer2016	Enter the SQL Server version. SQL Server 2012 and 2016 are supported.
Volume size (VolumeSize)	400	EBS volume size (gigabytes of data) to be attached to a node.
Volume type (VolumeType)	gp2	EBS volume type (gigabytes of data) to be attached to a node [io1, gp2].

- On the **Review** page, review and confirm the template settings. Under **Capabilities**, select the two check boxes to acknowledge that the template will create IAM resources and that it might require the capability to auto-expand macros.
- Choose **Create** to deploy the stack.
- Monitor the status of the stack. When the status is **CREATE_COMPLETE**, the Solumina cluster is ready.
- Use the URLs displayed in the **Outputs** tab for the stack to view the created resources.
- When you see a stack named **UIStack** with a status of **CREATE_COMPLETE**, the Quick Start has successfully created the Solumina environment.

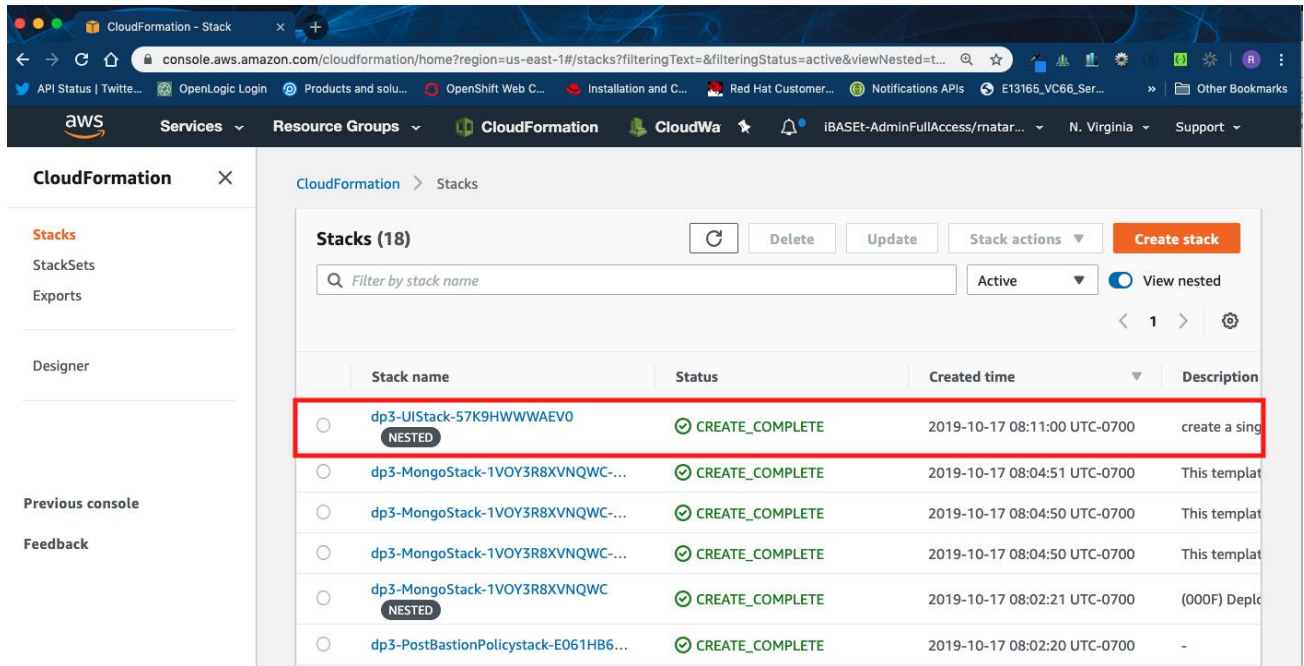


Figure 2. Checking the CloudFormation Stack

- For all relevant endpoints, server hostnames, and IP addresses, check the AWS Systems Manager (SSM) Parameter Store for the following list of parameter keys:

Parameter key	Description
EFSID	SSM parameter for storing the EFS ID.
ELKDomain	SSM parameter for getting the Kibana (ELK) URL.
MongoPrimaryIP	SSM parameter for storing the primary MongoDB replica set IP address.
MongoSecondaryIP	SSM parameter for storing the secondary MongoDB replica set IP address.
MongoSecondaryIP	SSM parameter for storing the tertiary MongoDB replica set IP address.
SQLDatabaseEndpoint	SSM parameter for getting RDS server host name.
SQLDatabaseJdbcURL	SSM parameter for getting RDS server JDBC URL.
SoluminaEndpoint	SSM parameter for storing the Solumina endpoint URL.
bastionID	Instance ID of the bastion host to manage EKS.

12. To access the Solumina web application, navigate to the SSM Parameter Store in your Region, look for the *SoluminaEndpoint* parameter, and note the endpoint value. This is the Solumina endpoint for the user interface.

Step 3. Test the deployment

- Navigate to the URL for Solumina using the endpoint that you noted in the previous section.
- Log in to the Solumina server using the setup credentials (the default setup creates an administrator profile). Contact [iBASEt sales](#) for licensing information. You will be able to complete the login after installing the license.

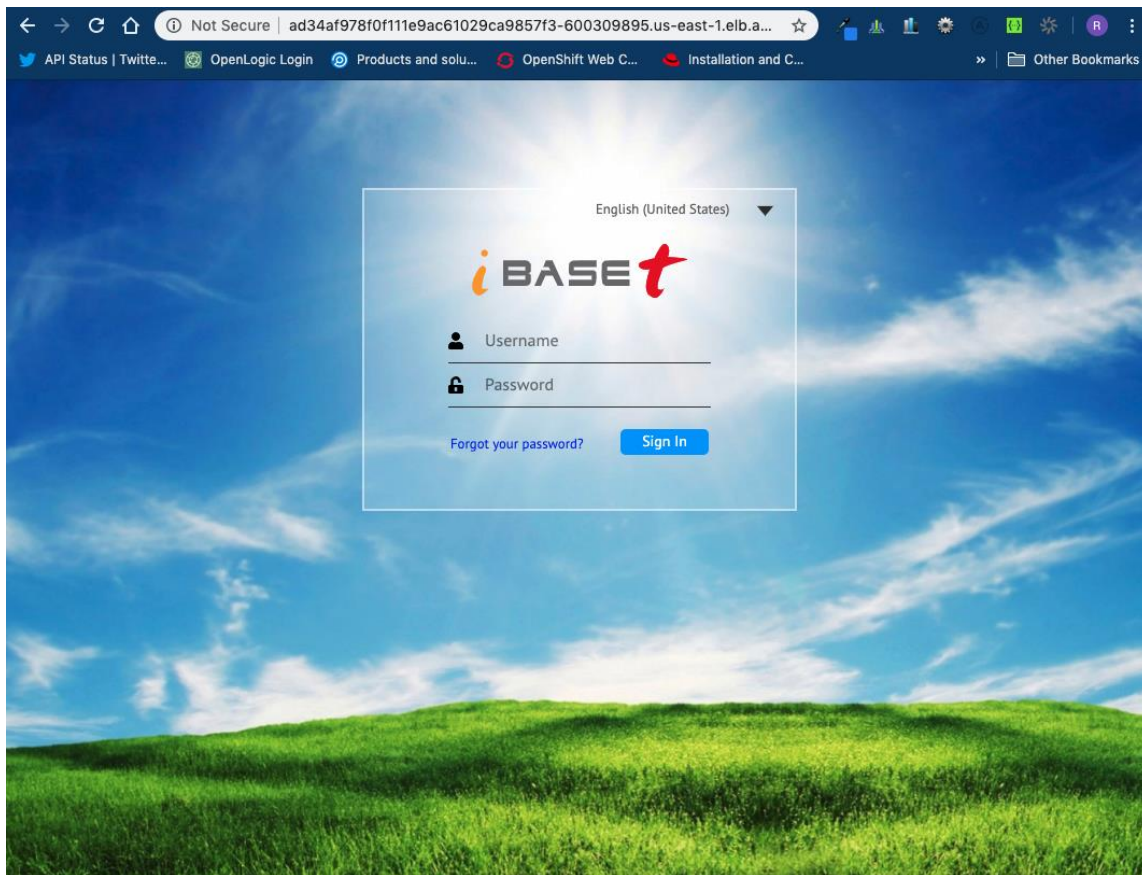


Figure 3. Solumina login page

FAQ

Q. I encountered a **CREATE_FAILED** error when I launched the Quick Start.

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.

Important When you set **Rollback on failure** to **No**, you will continue to incur AWS charges for this stack. Please ensure to delete the stack when you finish troubleshooting.

For additional information, see [Troubleshooting AWS CloudFormation](#) on the AWS website.

Q. I encountered a size limitation error when I deployed the AWS CloudFormation templates.

A. We recommend that you launch the Quick Start templates from the links in this guide or from another S3 bucket. If you deploy the templates from a local copy on your computer or from a non-S3 location, you might encounter template size limitations when you create the stack. For more information about AWS CloudFormation quotas, see the [AWS documentation](#).

Send us feedback

To post feedback, submit feature ideas, or report bugs, use the **Issues** section of the [GitHub repository](#) for this Quick Start.

Additional resources

AWS resources

- [Getting Started Resource Center](#)
- [AWS General Reference](#)
- [AWS Glossary](#)

AWS services

- [AWS CloudFormation](#)
- [Amazon EBS](#)
- [Amazon EC2](#)
- [IAM](#)
- [Amazon VPC](#)

Solumina documentation

- Contact [iBASEt sales](#) for information.

Other Quick Start reference deployments

- [AWS Quick Start home page](#)

Document revisions

Date	Change	In sections
January 2020	Initial publication	—

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Notices

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