LEXISNEXIS RISK SOLUTIONS

Setup of HPCC System on AWS

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Table of Contents

Setup of HPCC System on AWS

1. Introduction

This document tells how to configure and deploy an HPCC System on AWS using either of these Cloudformation templates: MyHPCCCloudFormationTemplate.json or MultiThorHPCCCloudFormationTemplate.json. The first template stands-up an HPCC System that has one THOR and/or one ROXIE. While the second template stands-up an HPCC System that (optionally) has more than one THOR and/or more than one ROXIE.

Configuring and deploying an HPCC System on AWS from linux is a three-step process when using the HPCC CloudFormation template and accompanying scripts found on github at https://github.com/tlhumphrey/EasyFastHPCCoAWS. The three-step process is:

1. Clone the github repository https://github.com/ tlhumphrey/EasyFastHPCCoAWS
2. Copy the scripts in the folder, AWSInstanceFiles (or MultiThorAWSInstanceFiles if using the cloudformation template, MultiThorHPCCCloudFormationTemplate.json), and your ssh pem file to an S3 bucket.
3. Build a stack, using CloudFormation on the AWS console, that does the rest.

When you get to section 4, “Using CloudFormation …”, you need:

1. An ssh key pair. Appendix A gives detailed instructions on how to make the key pair on the AWS console.
2. If you aren’t the administrator of your AWS account, then you may not have the permissions to build the stack that launches your HPCC System. So, ask your AWS administrator to follow the instructions in Appendix B, “Making IAM Super-Power-Group”, to make the Super-Power-Group and add you to it.

1.1 Document Conventions

Throughout this document we have commands that you must enter at the command line of a bash shell. These commands are shown in this document in a blue background, like the following command.

```
ls -l
```

Also, throughout this document are screenshots that show current topic web pages. I don’t always show the whole page. Often the right side of the web page has been chopped off. In addition, often you’ll see a green arrow that points to something of interest. These green arrows look like:

Also, in this document you will find helpful tips in boxes marked with this symbol:  And, warnings or cautions marked with this symbol: 

2. Clone https://github.com/tlhumphrey/EasyFastHPCCoAWS

You can get the contents of the EasyFastHPCCoAWS repository by cloning it using 'git'. So, first cd into the directory where you want the cloned repository. Then do the following command.

```
git clone https://github.com/tlhumphrey/ EasyFastHPCCoAWS.git
```

	There are directions for installing 'git' on linux here: https://gist.github.com/derhuerst/1b15ff4652a867391f03

You will need an account on github.

3. Make an S3 Bucket and Copy Scripts and Ssh Pem File

Here is a summary of this process:

1. Make an S3 bucket to copy scripts (contents of AWSInstanceFiles or MultiThorAWSInstanceFiles directory) and ssh pem file **(by the way, the pem file MUST end with ".pem")**.
2. Copy scripts (contents of one of the directories mentioned above) and ssh pem file into the created S3 bucket.

You need aws cli installed on your linux machine. Installation instructions are given here http://docs.aws.amazon.com/cli/latest/userguide/installing.html.

Here is the url for the awscli reference guide: http://docs.aws.amazon.com/cli/latest/index.html

3.1 Make an S3 Bucket

First, you need an s3 bucket to copy the scripts and ssh pem file. The following commands make an s3 bucket called BuildHPCCScripts.

```
aws s3 mb s3://BuildHPCCScripts
```

Next, cd into the folder containing all scripts (either AWSInstanceFiles or MultiThorAWSInstanceFiles if using the cloudformation template, MultiThorHPCCCloudFormationTemplate.json). And, copy your ssh pem file into this folder. **Don't forget to copy your ssh pem file into the folder.**

3.2 Copy Scripts and Ssh Pem File to S3 Bucket

The following command copies everything in the current folder into the s3 bucket, BuildHPCCScripts.

```
aws s3 cp . s3://BuildHPCCScripts --recursive
```

You can check to see if the scripts and ssh pem file are in the s3 bucket using the following command.

```
aws s3 ls s3://BuildHPCCScripts --recursive
```

4. Using CloudFormation on AWS Console to Configure and Deploy an HPCC System

This section will show you how to configure and deploy an HPCC System from the AWS console.

Instead of using the AWS console, Appendix C shows you how to launch the CloudFormation template using awscli

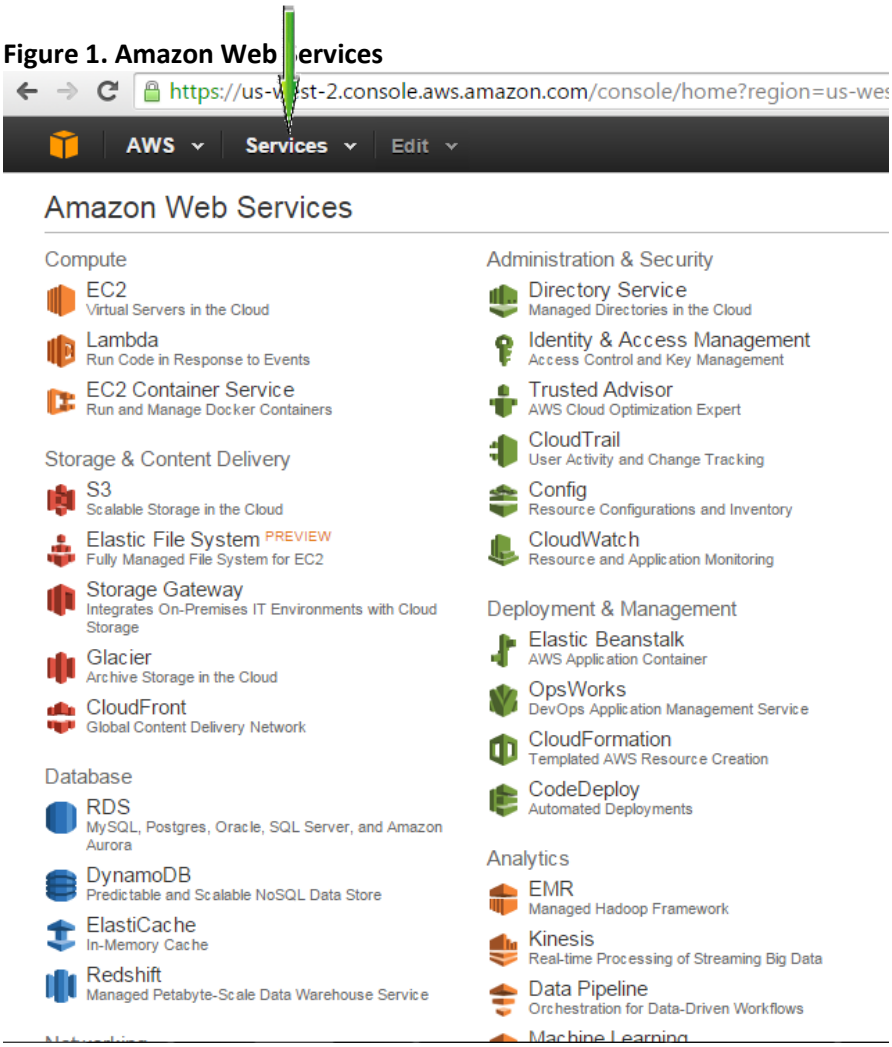
Here is a summary of this process:

1. Navigate to the CloudFormation (CF) web page on the AWS console.
2. Give the path to the HPCC CF template, i.e. MyHPCCCloudFormationTemplate.json or MultiThorHPCCCloudFormationTemplate.json.
3. Enter a Unique Name for the stack being created and fill in the HPCC CF template parameters.
4. Click the “Create” button to start the process of creating the HPCC System on AWS.

4.1 Navigate to CloudFormation Web Page

After logging into the AWS console (from your browser), you should see a web page that looks like Figure 1, below. Click on “Services”, (pointed to by the green arrow in Figure 1).

Figure 1. Amazon Web Services



On the next web page, which is a list of all AWS services, click on CloudFormation (pointed to by the green arrow of Figure 2).

Figure 2. All AWS Services

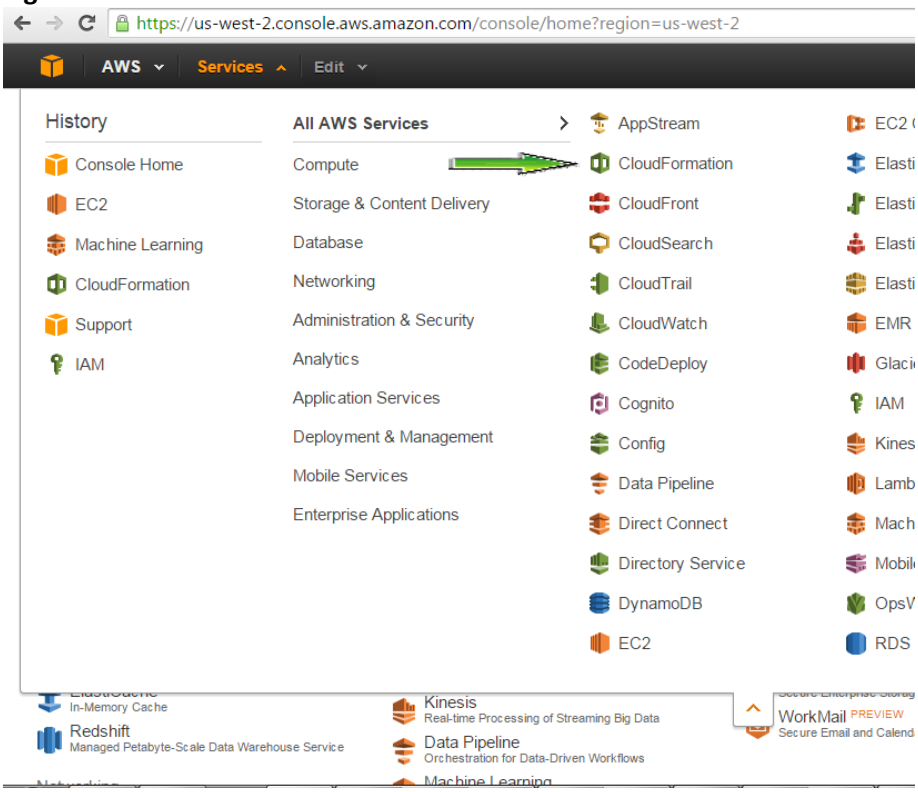
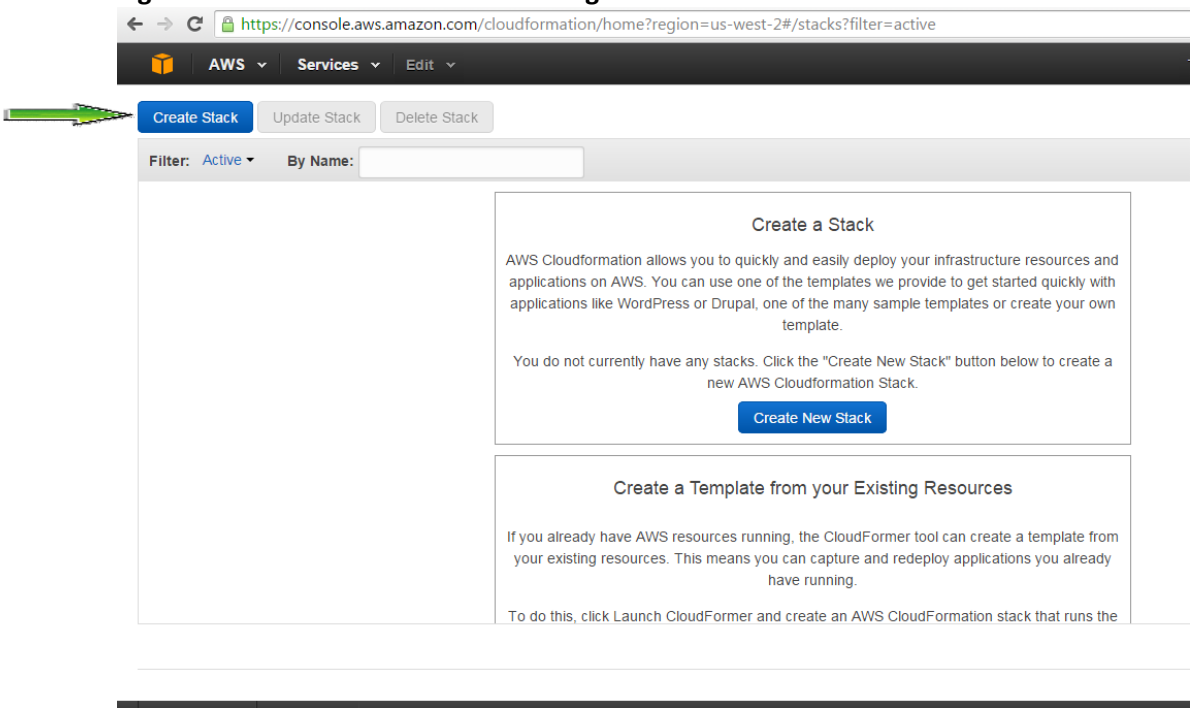


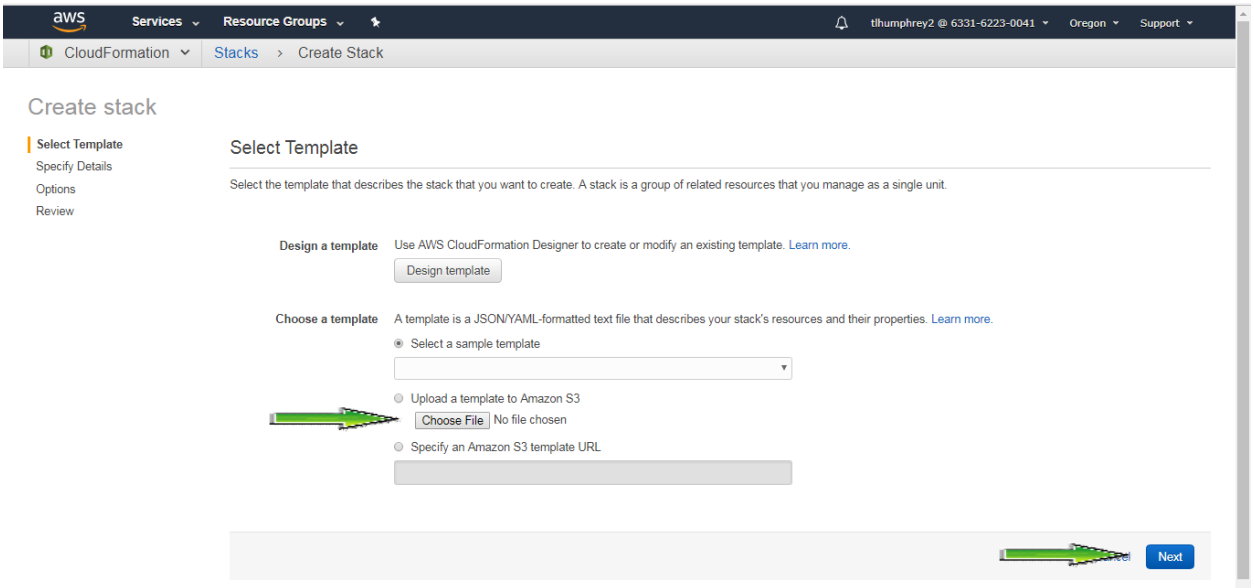
Figure 3 shows the first page of the CloudFormation section (if other cloudformation stacks have been created, they will be listed here). Click on “Create Stack” to begin the process of configuring and deploying an HPCC System to AWS. (“Create Stack” is pointed to by the green arrow of Figure 3).

Figure 3. First CloudFormation Web Page



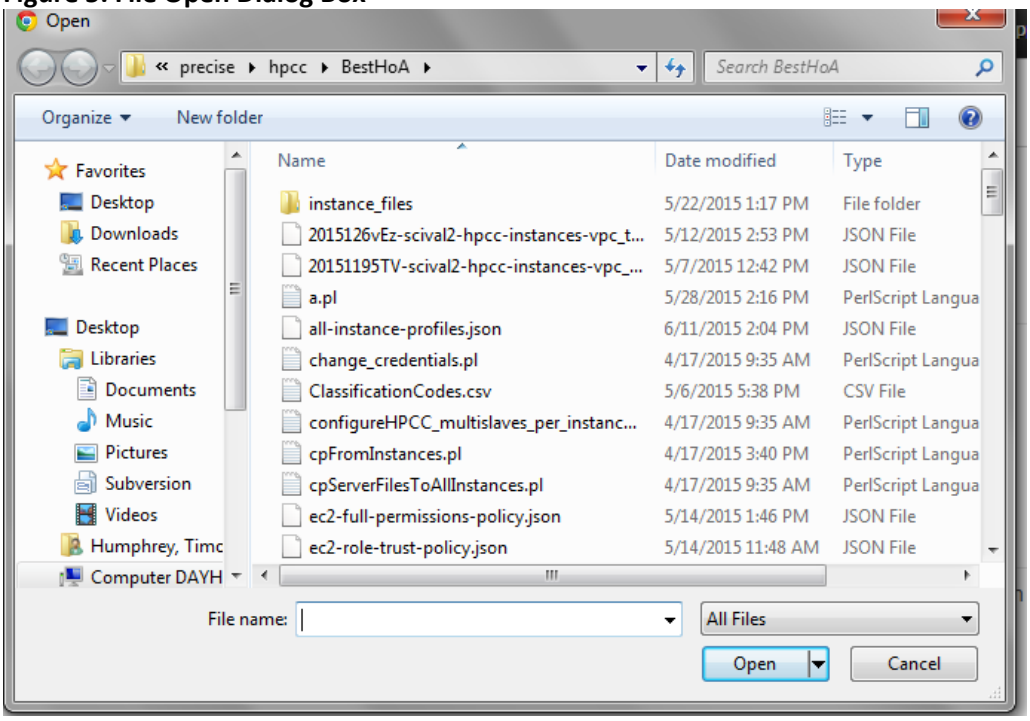
When you click on “Create Stack”, the next page you see is the “Select Tempate” page shown is Figure 4. On this page you a) select the cloudformation template that configures and deploys an HPCC System and b) click on “Next” to go to the next page.

Figure 4. Select Template Web Page



When you click on “Choose File” (pointed to by the left most green arrow of Figure 4), you get an open-file dialog box (like that of Figure 5, below). Use it to find and select the cloudformation template, i.e. MyHPCCCloudFormationTemplate.json or MultiThorHPCCCloudFormationTemplate.json. Note: “Choose File” may have a different name, like “Browse”. But, the button you click on will be under “Upload a template to Amazon s3”.

Figure 5. File Open Dialog Box



Use the open-file dialog box to find the HPCC CF template and then click on open. The name of the HPCC CF template is: MyHPCCCloudFormationTemplate.json or MultiThorHPCCCloudFormationTemplate.json. After selecting the template click on “Next” (pointed to by the right most green arrow in Figure 4). The next page you see should look like Figure 6a (or Figure 6b for multi-thor CF template), Specify Details, shown below.

Figure 6a. Specify Details, for Template, MyHPCCCloudFormationTemplate.json

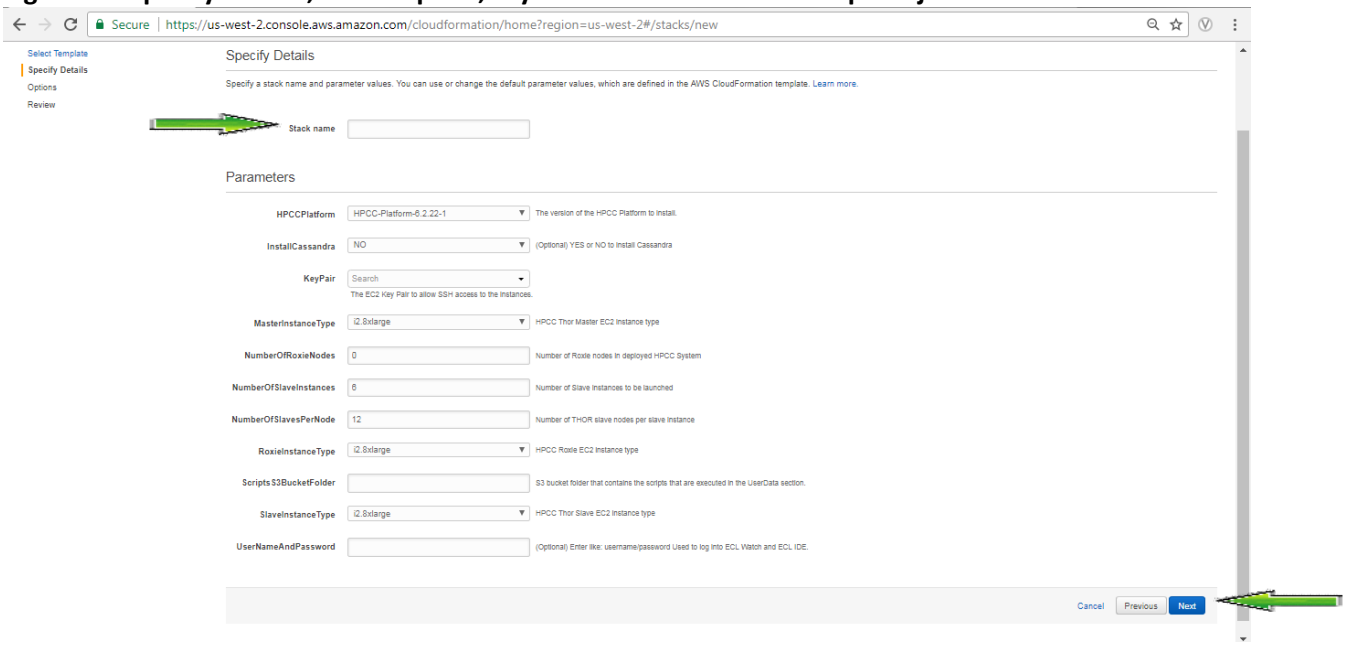
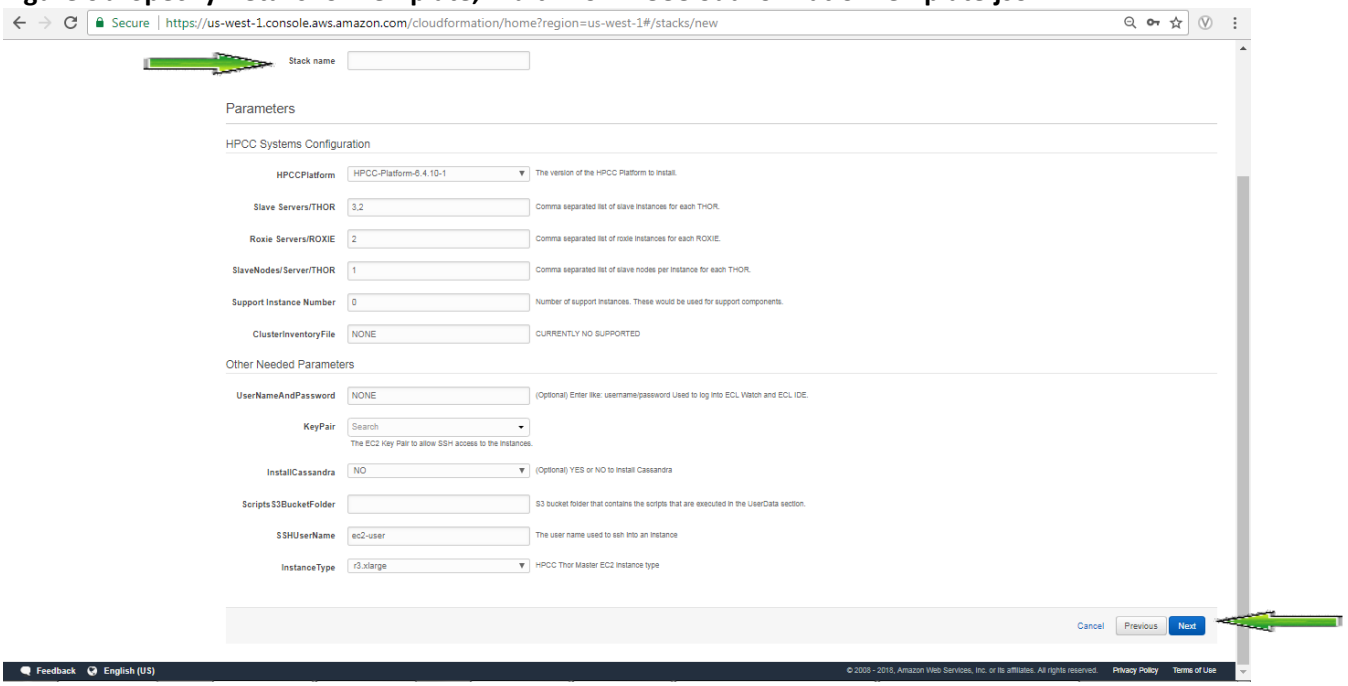


Figure 6b. Specify Details for Template, MultiThorHPCCCloudFormationTemplate.json



On the Specify Details page, you will enter a “Stack name” and enter or modify the other parameters on the page.

The “Stack name” textbox is pointed to by the left most green arrow. **You MUST specify a unique name for the “Stack name” (a name that has never been used).** Guidance for creating the “Stack name” can be found here: http://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/cfn-using-console-

create-stack-parameters.html.

You will notice that some of the parameters that configure the HPCC System already have values and some do not. Plus, some have dropdown menus and some do not.

Tables 1a and 1b show parameters that already have values for MyHPCCCloudFormationTemplate.json and MultiThorHPCCCloudFormationTemplate.json, respectively.

Table 1a. MyHPCCCloudFormationTemplate.json Parameters that already of Values

MyHPCCCloudFormationTemplate.json Parameters that already of Values		
Parameter Name	**Description**	**Values**
SSHUserName	User name used for ssh	ec2-user
HPCCPlatform	HPCC System Platform to install	HPCC-Platform-6.2.22-1
InstallCassandra	YES or NO do you want Cassandra installed	NO
[Master, Roxie, Slave]InstanceTypes	Instance type for Master, Roxies or Slaves	All 3 are i2.8xlarge
Numberof[Roxie,Slave]Instances	Number of Roxie or Slave Instances	0, 12 respectively
NumberOfSlavesPerInstance	Number of slave nodes on each instance	6

Table 1b. MultiThorHPCCCloudFormationTemplate.json Parameters that already of Values

Parameter Name	Description	Values
SSHUserName	User name used for ssh	ec2-user
HPCCPlatform	HPCC System Platform to install	HPCC-Platform-6.4.10-1
InstallCassandra	YES or NO do you want Cassandra installed	NO
InstanceType	Instance type for Master, Roxies Slaves, and Support	r3.xlarge
Slave Servers/THOR	Number of slave server for each THOR	3,2
Roxie Servers/ROXIE	Number of Roxie servers for each ROXIE	2
SlaveNodes/Server/THOR	Number of slave nodes on each server for each THOR	1
Support Instance Number	Number of support instances	0
ClusterInventoryFile	Name of Inventory File	NONE
UserNameAndPassword	Username/password to access cluster	NONE

Tables 2a and 2b show parameters that do not have values for MyHPCCCloudFormationTemplate.json and MultiThorHPCCCloudFormationTemplate.json, respectively.

Table 2a. MyHPCCCloudFormationTemplate.json Parameters that Need Values

Parameter Name	Description
KeyPair	Private key used for ssh
ScriptsS3BucketFolder	S3 Bucket where instance scripts exist
UserNameAndPassword	User name and password for ECL Watch or IDE.

Table 2b. MultiThorHPCCCloudFormationTemplate.json Parameters that Need Values

Parameter Name	Description
KeyPair	Private key used for ssh
ScriptsS3BucketFolder	S3 Bucket where instance scripts exist

Tables 3a and 3b show parameters that have dropdown menus for MyHPCCCloudFormationTemplate.json and MultiThorHPCCCloudFormationTemplate.json, respectively. So you can select the parameter values instead of typing them in.

Table 3a. MyHPCCCloudFormationTemplate.json Parameters with Dropdown Menus

Parameter Name	Description
SSHUserName	User name used for ssh
HPCCPlatform	HPCC System Platform to install
InstallCassandra	YES or NO do you want Cassandra installed
[Master,RoxieSlave] InstanceTypes	Instance type for Master, Roxies or Slaves
KeyPair	Private key used for ssh

Table 3b. MultiThorHPCCCloudFormationTemplate.json Parameters with Dropdown Menus

Parameter Name	Description
SSHUserName	User name used for ssh
HPCCPlatform	HPCC System Platform to install
InstallCassandra	YES or NO do you want Cassandra installed
InstanceType	Instance type for all instances
KeyPair	Private key used for ssh

Tables 4a and 4b show parameters that you type in their values for MyHPCCCloudFormationTemplate.json and MultiThorHPCCCloudFormationTemplate.json, respectively.

Table 4a. MyHPCCCloudFormationTemplate.json Parameters you type in their values

Parameter Name	Description
Number of [Roxie,Slave] Instances	Number of Roxie or Slave Instances
NumberOfSlavesPerInstance	Number of slave nodes on each instance
ScriptsS3BucketFolder	S3 Bucket where instance scripts exist
UserNameAndPassword	User name and password for ECL Watch or IDE.

Table 4b. MultiThorHPCCCloudFormationTemplate.json Parameters you type in their values

Parameter Name	Description
Slave Servers/THOR	Number of slave server for each THOR
Roxie Servers/ROXIE	Number of Roxie servers for each ROXIE
SlaveNodes/Server/THOR	Number of slave nodes on each server for each THOR
Support Instance Number	Number of support instances
ScriptsS3BucketFolder	S3 Bucket where instance scripts exist
UserNameAndPassword	User name and password for ECL Watch or IDE.

One parameter that must be typed in is ScriptsS3BucketFolder. If your s3 bucket is the same as the one we created in Section 3, the value for ScriptsS3BucketFolder will be:

```
s3://BuildHPCCScripts
```

To reduce the cost during the testing of the CloudFormation template, a) I changed the instance types for the master, roxie, and slaves to something that didn't cost much per hour, e.g. the c3.large instance type currently cost only $0.21 per hour; and b) I changed the number of roxie and slave instances launched.

4.2 Notes About Some Parameters of MultiThorHPCCCloudFormationTemplate.json

The 3 parameters: Slave Servers/THOR, Roxie Servers/ROXIE and SlaveNodes/Server/THOR are comma separated lists of numbers. Each number in the comma separated list tells the number of servers for one of the Slaves or Roxies. Or for the parameter, SlaveNodes/Server/THOR, each number in its comma separated list tells the number of slave nodes on each of that THOR's servers.

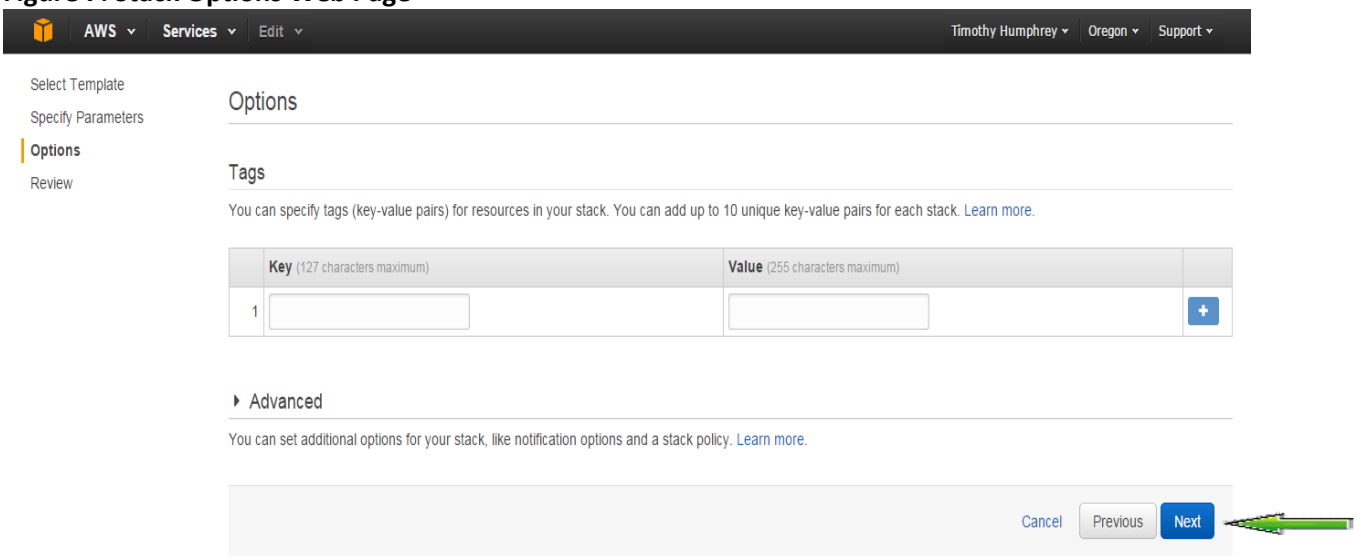
For example, if you want 3 THORs one with 2 servers, the 2nd with 3 servers and the 3rd with 1 server then Slave Servers/THOR should have the following value:

```
2,3,1
```

4.3 Start Creation Process

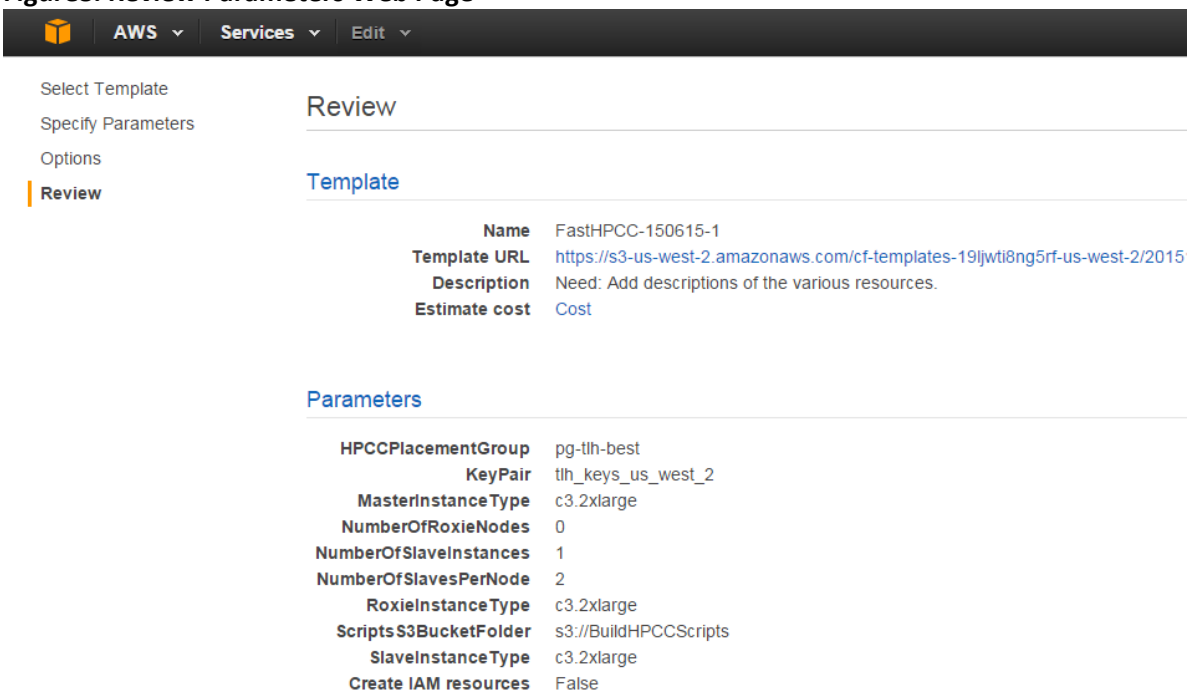
Once you have the parameters the way you want them, you click on "Next" (where the right most green arrow points in Figure 6a or Figure 6b, above). The next web page looks like Figure 7, below.

Figure 7. Stack Options Web Page



There is nothing to do on this web page. So, just click the "Next" button to continue to the next web page which looks like Figure 8, below (Note. Figure 8 is what you see if the Cloudformation template is MyHPCCCloudFormationTemplate.json).

Figure8. Review Parameters Web Page

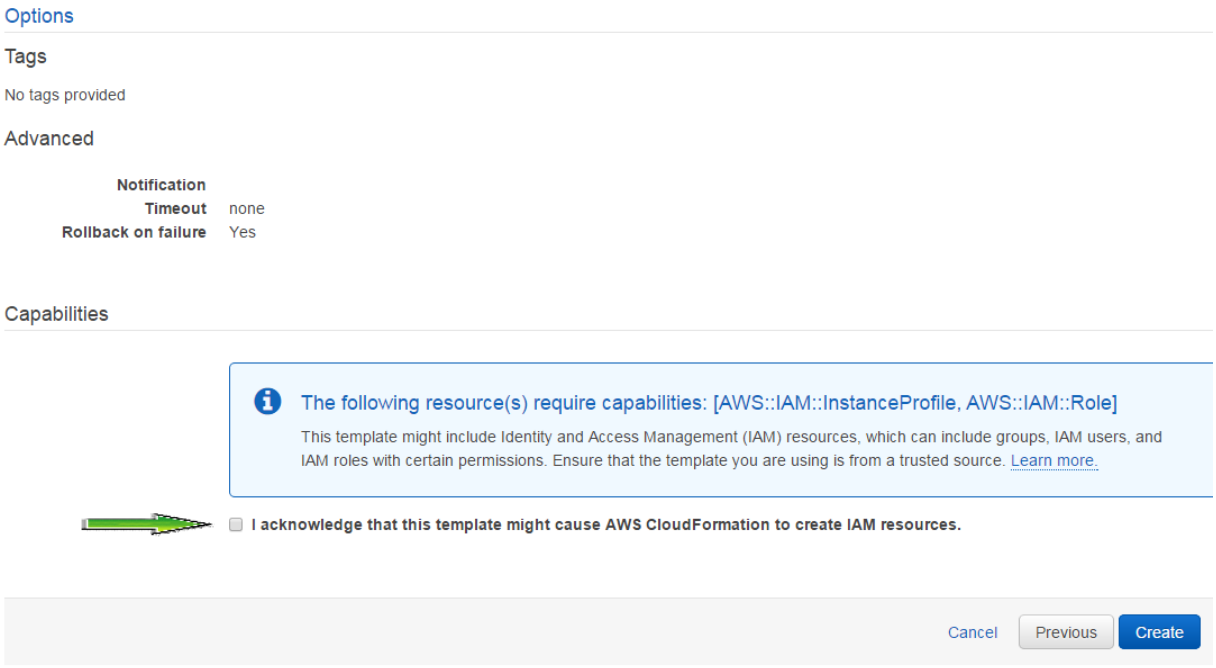


This page shows all your settings, so you can verify they are what you want before starting the stack building process.

The next screenshot, Figure 9, shows the same web page as above, except I've scrolled down so you can see the "Create" button. You click on the "Create" button to start the stack building process.

But, before you do, you must click on the acknowledge checkbox (pointed to by the green arrow of Figure 9, below) to indicate that you know that the template comes from a trusted source. Why? Because the template creates AWS resources that you have to pay for and also the template gives permission to the instances created to access AWS resources such as S3 buckets.

Figure9. Bottom of Review Parameters Web Page

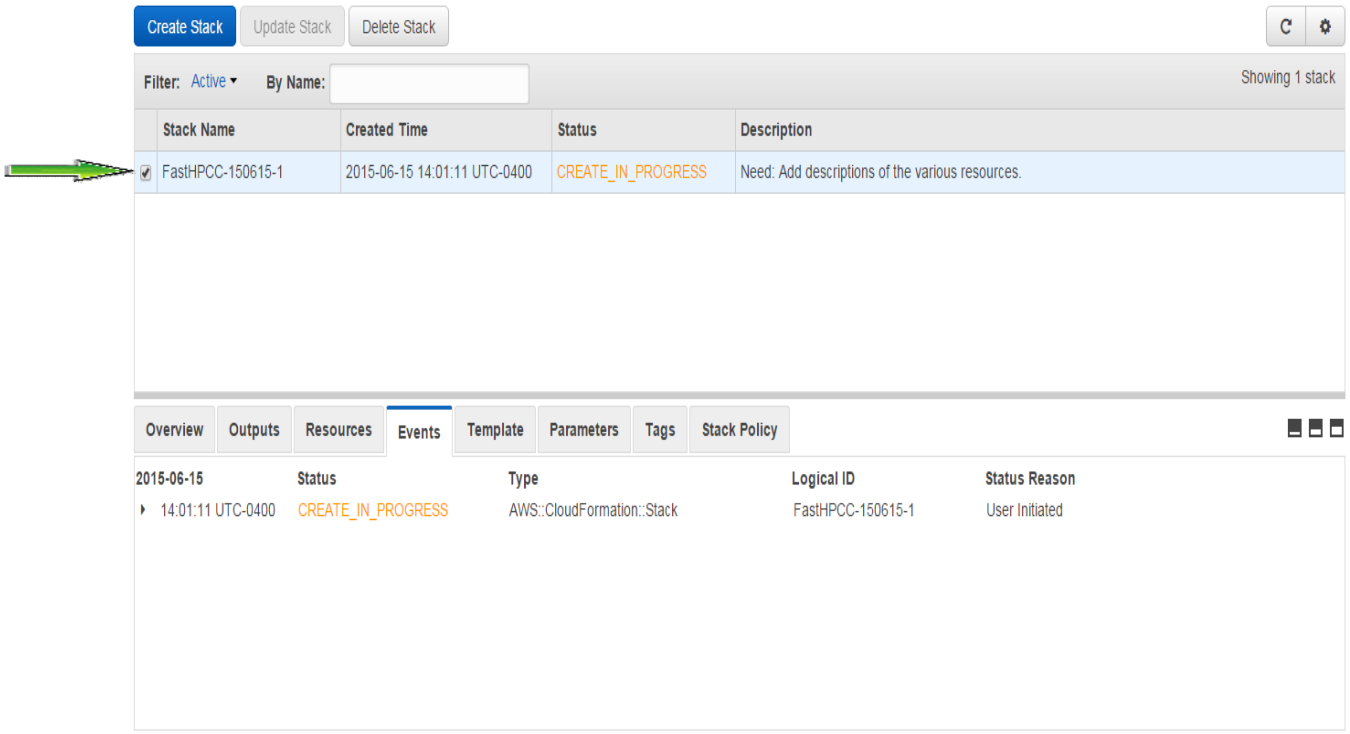


The next web page you see should look like Figure 10, below.

It is divided into 2 parts. The top part shows the stacks (in this case only one). And what the bottom part shows depends on which tab you have selected, i.e. Overview or Outputs or Resources or Events or Template or Parameters or Tags or Stack Policy or Change Set. In Figures 10 through 12, I have selected the Events tab because it tells you the progress of the "stack build" process.

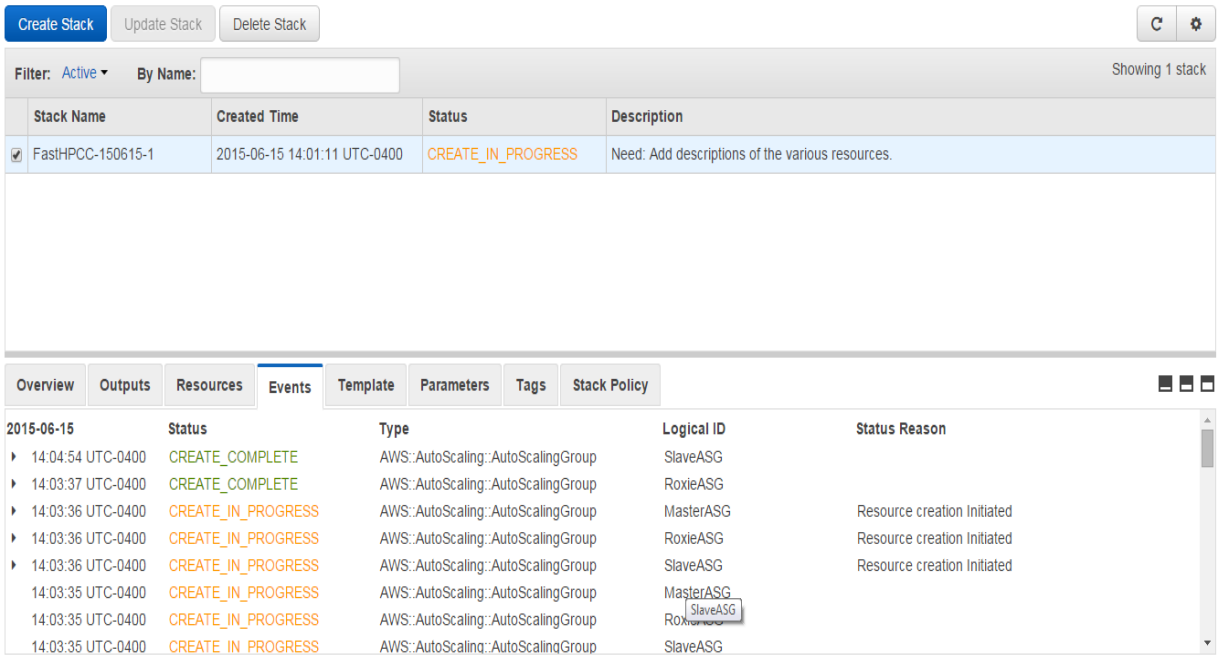
	The security group (firewall) created for the launched HPCC System has port 8010 and port 22 open to the world. You may want to change these to specific IPs or IP ranges. Click on this link, http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/authorizing-access-to-an-instance.html, for information about how to change inbound traffic to these ports.

Figure 10. Show Stacks Web Page



If you refresh the web page, you will see an update of the progress of the "stack build" process (like Figure 11, below).

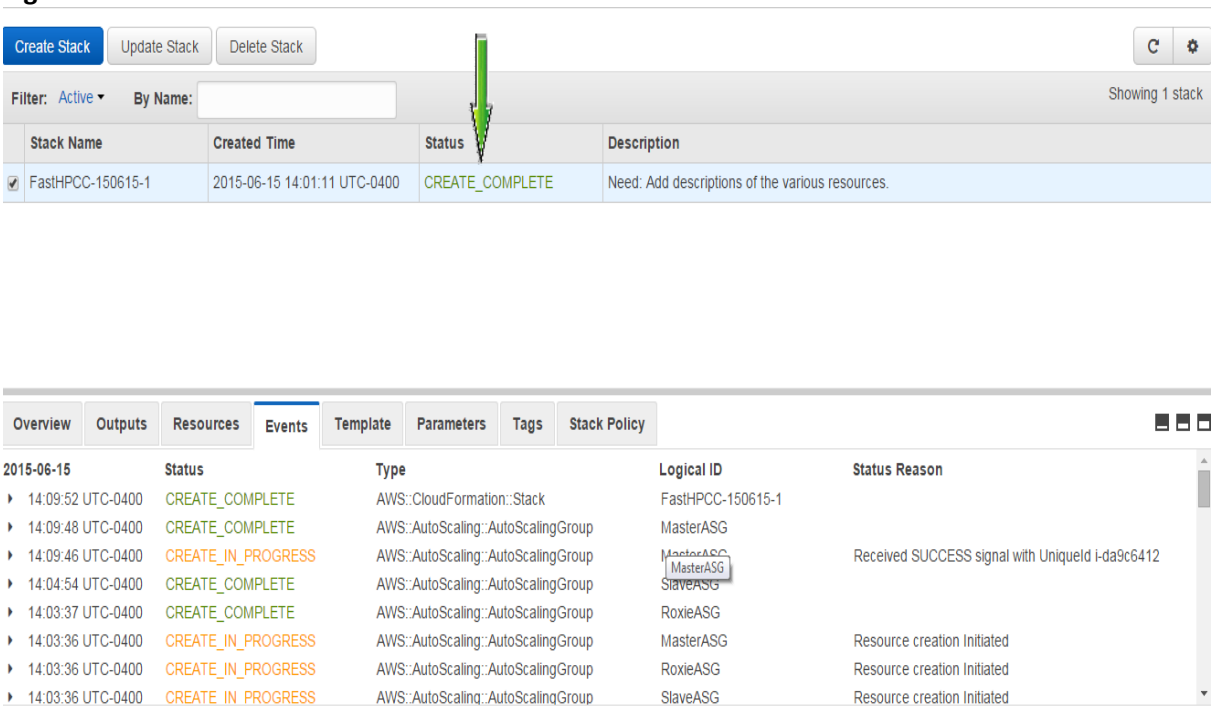
Figure 11. Updated Show Stacks Web Page



	During the stack build process, you may get an error message that contains the words "not authorized to perform:iam:CreateRole", which means you don't have the proper permissions to create the stack. So, ask your AWS administrator to follow the instructions in Appendix B, "Making IAM Super-Power-Group", to make the Super-Power-Group and add you to it.

The stack build process is done (meaning the HPCC System is setup) when "CREATE_COMPLETE" is the Status of the stack building process (where the green arrow points in Figure 12, below).

Figure 12. Finished Stack Creation



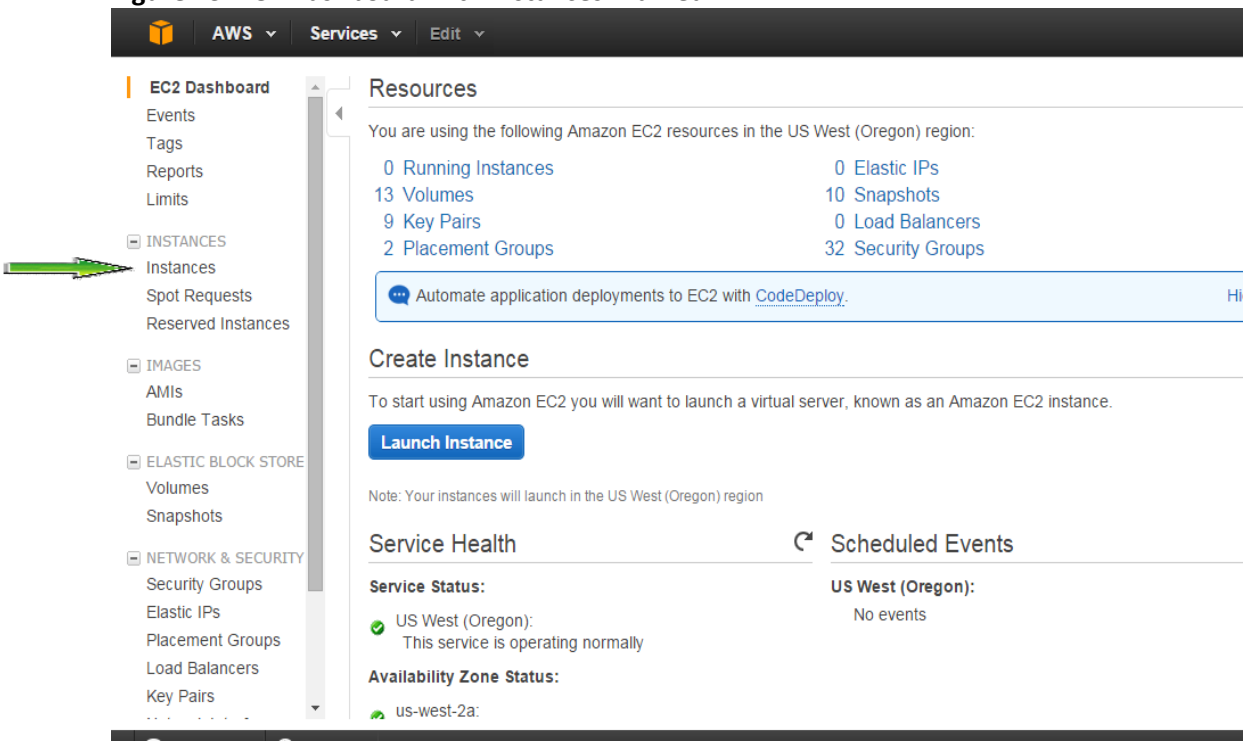
When the stack build process has completed, go to the "Instances" page on the AWS console to get the IP address of the Master, which is needed to access ECL Watch and to setup the ECL IDE. If you are using template, MultiThorHPCCCloudFormationTemplate.json, and do not have a master instance then you need the public IP of the Support instance.

	Once you have finished with the deployed HPCC System, delete the stack so all resources are terminated and AWS charges won't continue.

4.4 Getting Public IP of Master(or Support)

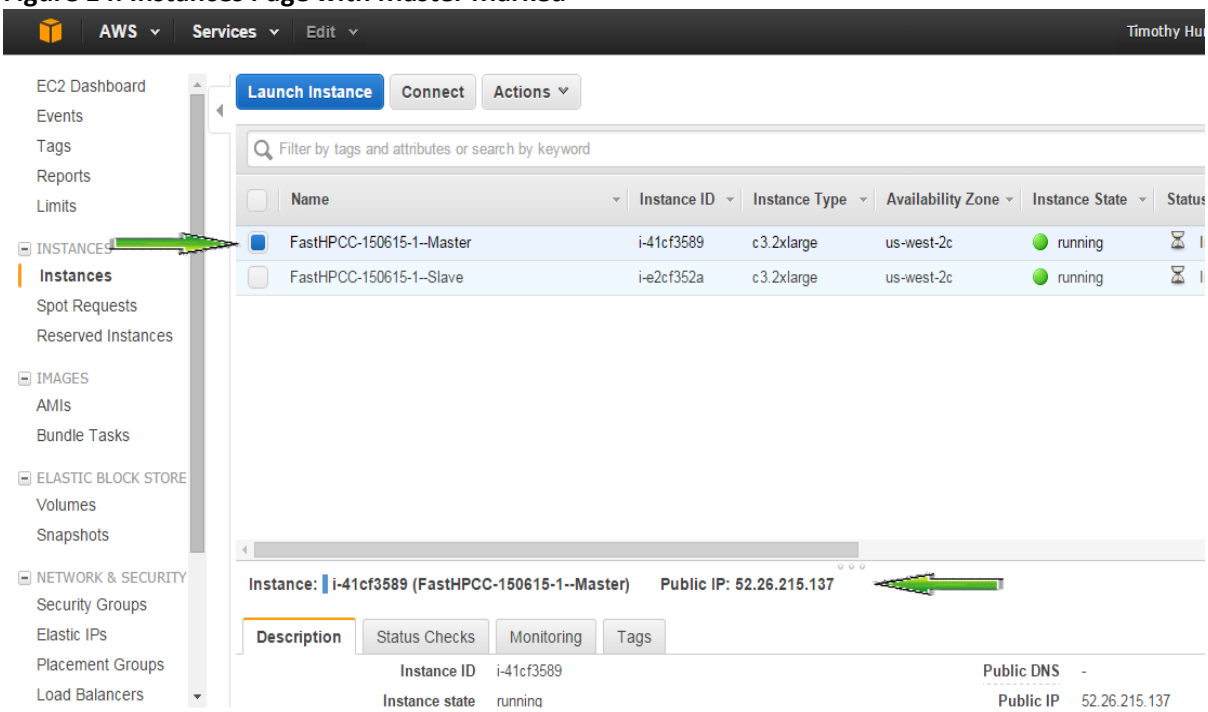
From the EC2 Dashboard, click on “Instances” (pointed to by the green arrow of Figure 13, below).

Figure 13. EC2 Dashboard with Instances Marked



Next, you will see the Instance page which should look like Figure 14, below. The Master instance has been selected by clicking on the button just to the left of the instance’s name (pointed to by the top-left green arrow in Figure 14). And because this instance is selected, its Public IP address is shown where the bottom-right green arrow points. You can swipe across this Public IP address and save it. Then, paste it into your browser’s address bar and append “:8010” to access ECL Watch.

Figure 14. Instances Page with Master Marked

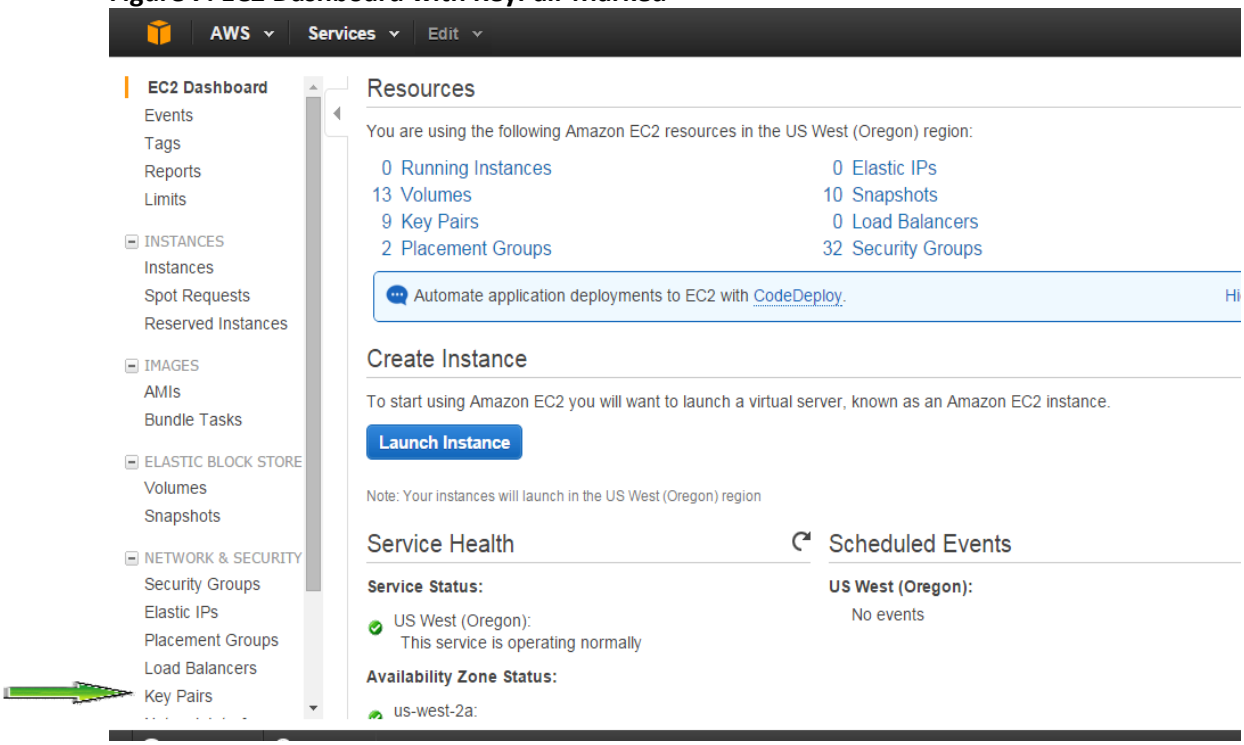


Appendix A. Make a Ssh Pem File

An ssh key pair is used by the nodes of your deployed HPCC System to access other nodes of the system. The following gives details on how to create an ssh key pair and have its pem file downloaded to your linux computer.

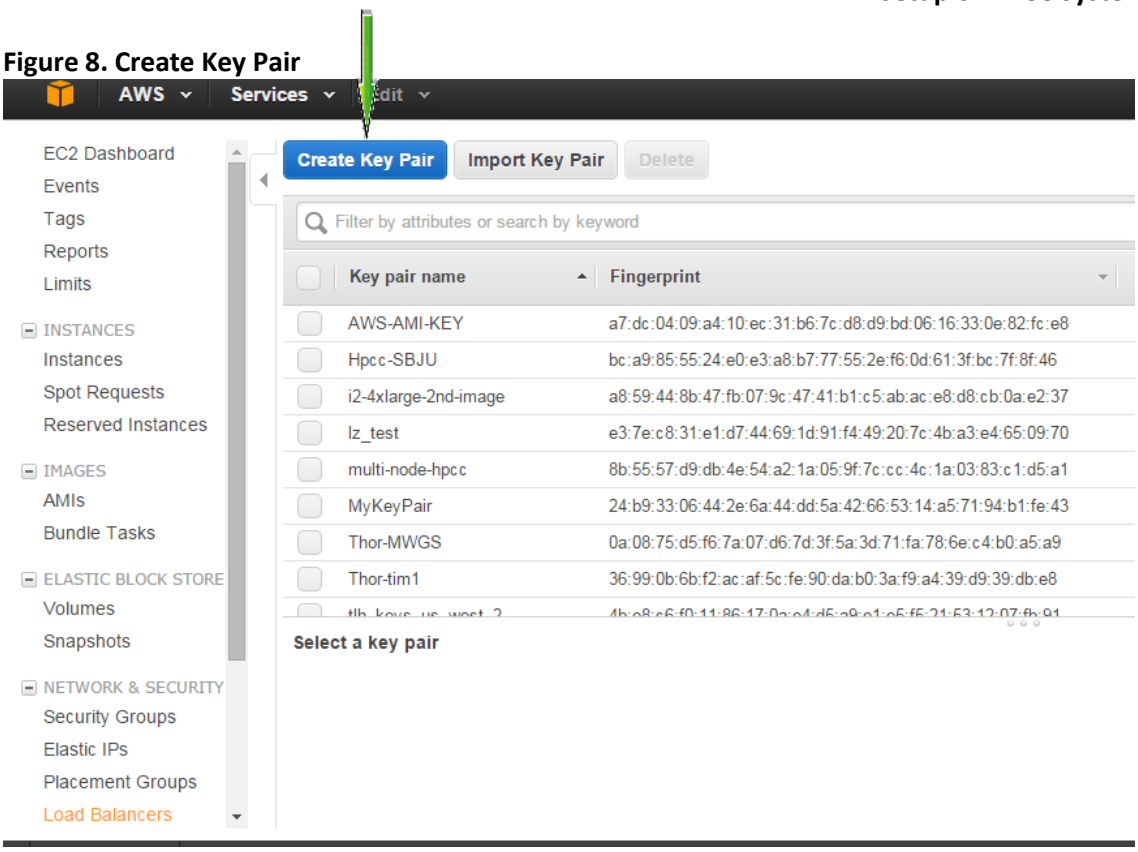
First, go to the EC2 Dashboard and select the region you will be using the key pair (select from dropdown menu on the right side of the dark ribbon at the top of the web page). And second, click on Key Pair (pointed to by the green arrow of Figure 25).

Figure 7. EC2 Dashboard with KeyPair Marked



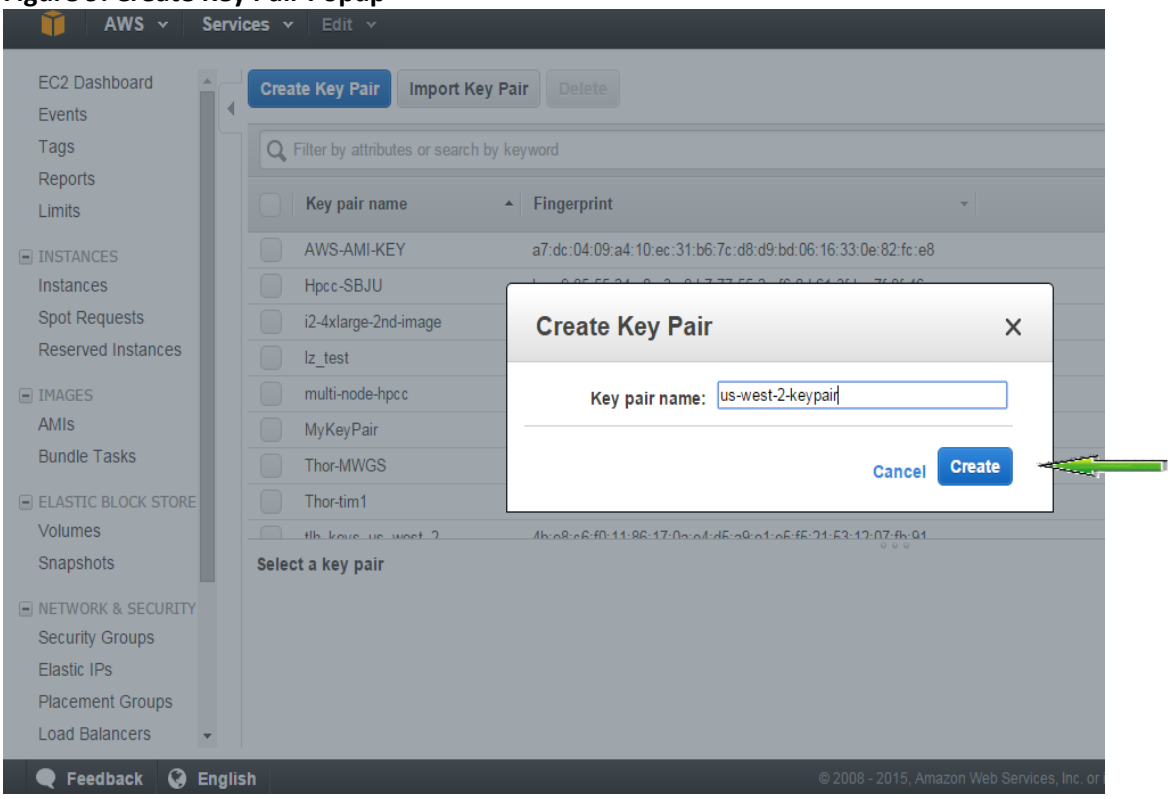
Next, you will see the page where you can create a new key pair. It should look like Figure 26, below. Click on “Create Key Pair” (pointed to by the green arrow of Figure 26).

Figure 8. Create Key Pair



Next, you will see a popup with the title “Create Key Pair”. It should look like Figure 27. Enter the name of your new key pair and then click on “Create” (pointed to by the green arrow of Figure 27). You will notice that in Figure 27, I entered the name “us-west-2-keypair”.

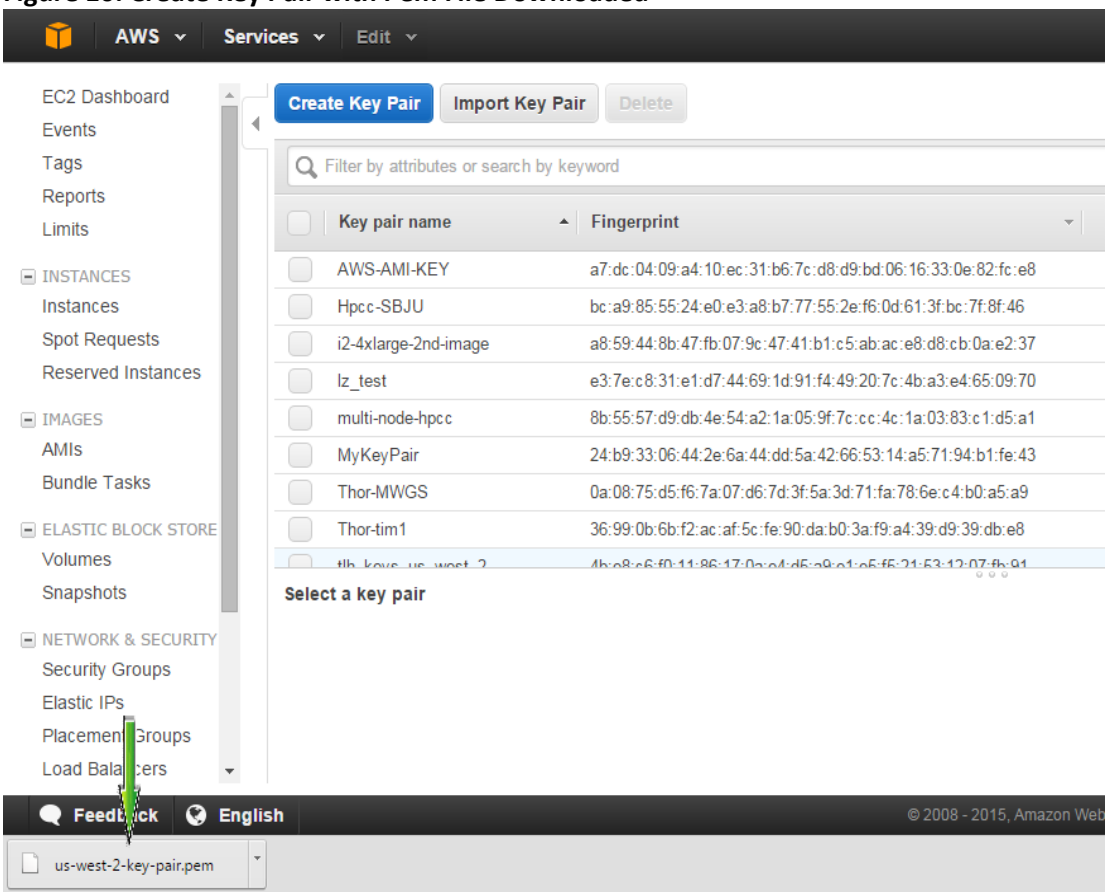
Figure 9. Create Key Pair Popup



After clicking on the “Create” button, the next thing you will see is a page that looks like Figure 28, below. And, you should get an indication that the pem file for the newly created key pair was downloaded to your linux computer (pointed to by the green arrow of Figure 28, below).

Copy this file into the folder, InstanceFilesForConfigureAndStartHPCC, of the cloned repository (see Section 2 for the location of this folder).

Figure 10. Create Key Pair with Pem File Downloaded



Appendix B. Making IAM Super-Power-Group

This must be done by the administrator of your AWS account. And, it only needs to be done if you get an error during stack creation saying you are “not authorized to perform:iam:CreateRole”.

Frist the administrator of your AWS account will create a new IAM group which I call Super-Power-Group using the policy in the file super-user-iam-policy.json of the cloned repository. Then, the administrator will place you in that group.

The following AWS cli command creates the Super-Power-Group (This can also be done on the AWS console using the instructions at http://docs.aws.amazon.com/IAM/latest/UserGuide/Using_CreatingAndListingGroups.html).

```
aws iam put-group-policy --group-name Super-Power-Group --policy-document file://super-user-iam-policy.json  --policy-name super-power-policy
```

To add a user to the Super-Power-Group:

1. Sign into the AWS console and open the IAM console, i.e. select IAM from Services.
2. Open the Users section by clicking on “Users” in the menu on the left.
3. Select the user you want to add to the group.
4. From the User Actions select Add User to Group
5. Select the group and click on Add to Groups (bottom right corner).

Appendix C. Using awscli to Configure and Deploy an HPCC System on AWS

Below is an example showing how to launch an HPCC System using the aws command-line interpreter, aws-cli, and the cloudformation template described in this document. This example assumes you are on a linux machine.

In this example, for the argument, --template-url, notice that the URL is the path to the S3 bucket that contains the scripts for the instances of the system. That is, this example expects to find the cloudformation template in this S3 bucket. Also, notice, in this example, that the KeyPair is the one created in Appendix A in region us-west-2.

```
aws cloudformation create-stack --capabilities CAPABILITY_IAM \
 --stack-name FastHPCC-150615-1  \
 --region us-west-2 \
 --template-url  https://s3.amazonaws.com/ BuildHPCCScripts /MyHPCCCloudFormationTemplate.json \
 --parameters \
  ParameterKey=SSHUserName,ParameterValue=ec2-user \
  ParameterKey=HPCCPlatform,ParameterValue=HPCC-Platform-6.2.22-1 \
  ParameterKey=KeyPair,ParameterValue=us-west-2-keypair \
  ParameterKey=MasterInstanceType,ParameterValue=c3.large \
  ParameterKey=RoxieInstanceType,ParameterValue=c3.large \
  ParameterKey=SlaveInstanceType,ParameterValue=c3.large \
  ParameterKey=NumberOfRoxieInstances,ParameterValue=0 \
  ParameterKey=NumberOfSlaveInstances,ParameterValue=1 \
  ParameterKey=NumberOfSlavesPerInstance,ParameterValue=1 \
  ParameterKey=ScriptsS3BucketFolder,ParameterValue=s3://BestHoA/instance_files
```