

Lab 6: Reduce compute costs using Instance Scheduler v1.0.5

Sunday, August 9, 2020 7:28 PM

Lab 6:

- Step 52, GUI Change, "Add/Edit Tags" is now "Manage Tags"
- Step 53, GUI Change, "Create Tag" is now "Add Tag"

Lab 6: Cost Optimization: Reduce compute costs using Instance Scheduler



In this lab, you will deploy a cost optimization solution, AWS Instance Scheduler, to configure custom start and stop schedules for Amazon Elastic Compute Cloud (Amazon EC2) and Amazon Relational Database Service (Amazon RDS) instances. By deploying this solution, you can help reduce operational costs by stopping resources that are not in use, and then start those resources again when their capacity is needed.

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Objectives

After completing this lab, you will be able to:

- Deploy AWS Instance Scheduler solution using a AWS CloudFormation template.
- Configure the custom schedule for when instances should be running.
- Configure resource tags to enable AWS Instance Scheduler to turn resources *on* and *off* as desired.
- Verify the cost reduction of Amazon EC2 resources due to customized usage schedules.

Prerequisites

This lab requires:

- Access to a notebook computer with Wi-Fi and Microsoft Windows, Mac OS X, or Linux (Ubuntu, SuSE, or Red Hat).
- The qwikLABS lab environment is not accessible using an iPad or tablet device, but you can use these devices to access the student guide.
- For Microsoft Windows users: Administrator access to the computer.
- An Internet browser such as Chrome, Firefox, or IE9 (previous versions of Internet Explorer are not supported).
- An SSH client such as PuTTY.

Duration

This lab will require **60** minutes to complete.

Start Lab

1. At the top of your screen, launch your lab by choosing [Start Lab](#)

This starts the process of provisioning your lab resources. An estimated amount of time to provision your lab resources is displayed. You must wait for your resources to be provisioned before continuing.

i If you are prompted for a token, use the one distributed to you (or credits you have purchased).

2. Open your lab by choosing [Open Console](#)

This opens an AWS Management Console sign-in page.

3. On the sign-in page, configure:

- **IAM user name:** `awsstudent`
- **Password:** Paste the value of **Password** from the left side of the lab page
- Choose [Sign In](#)

⚠ Do not change the Region unless instructed.

Common Login Errors

Error: You must first log out

Amazon Web Services Sign In

You must first log out before logging into a different AWS account.

To logout, [click here](#)

If you see the message, **You must first log out before logging into a different AWS account:**

- Choose **click here**
- Close your browser tab to return to your initial lab window
- Choose **Open Console** again

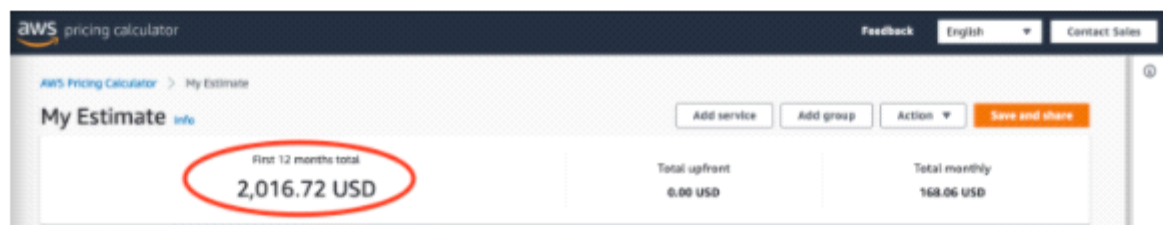
Introduction

Thus far, you have optimized many components of your environment to reduce costs. However, there are still resources that are configured to run 24 hours a day in spite of usage patterns that do not support that level of deployment. In browsing through the AWS documentation, you find information on AWS Instance Scheduler -

<https://aws.amazon.com/solutions/implementations/instance-scheduler/>.

Instance Scheduler is one example of a solution developed by AWS and made available for customers to implement.

Based on the resources provisioned for you at the start of the lab, day and night operation of the two instances supporting your AP Imaging application would cost just over \$2000 per year to operate as on-demand instances.



The prices are as of 5/12/2020. If you would like to review this estimate in more detail, please select here: <https://calculator.aws/#/estimate?id=fbd9bf063771db2e2a7509856d3904b63a402237>

In this lab, you will deploy the Instance Scheduler solution to automate the stopping and starting of Amazon Elastic Compute Cloud (Amazon EC2) and

Amazon Relational Database Service (Amazon RDS) instances in your environment to match business hours when staff will be using the application, reducing operational costs.

You will deploy the architecture shown in the image below.



Task 1: Deploy the Instance Scheduler CloudFormation Template

The AWS Instance Scheduler is a solution that automates the starting and stopping of Amazon EC2 and Amazon RDS instances, based on user-defined schedules stored in DynamoDB. The Instance Scheduler leverages AWS resource tags to identify which instances follow the specified schedules. Amazon CloudWatch Events run on a CRON schedule will trigger AWS Lambda to automatically stop and restart instances across the specified AWS Regions and accounts.


Task 1.1: Create CloudFormation Stack

In this task, you will deploy the CloudFormation stack that is used to deploy the Instance Scheduler solution in your account.

4. Download the Instance Scheduler CloudFormation template to your local machine using this link [InstanceScheduler](#)
5. Open **AWS CloudFormation** by selecting **Services ▾** and typing `cloudformation` in the filter box.
6. Choose **CloudFormation**.
7. Expand the left menu by selecting **☰**
8. Choose **Stacks**.
9. Choose **Create stack ▾**
10. Choose **With new resources (standard)**.
11. For **Template source** select **Upload a template file**.
12. Choose **Choose file** and select the **instancescheduler.json** file that you downloaded previously.
13. Choose **Next**
14. For **Stack name** enter `InstanceScheduler`

NOTE: Under **Parameters**, make note of the text in the **Instance Scheduler tag name** field. The value should be `Schedule`; this is the name of the tag key that you will use to identify which resources you want to adhere to the defined schedule. Feel free to review other parameters and options associated with this solution.

15. Leave the other values on the page the same, and choose **Next**

15. Leave the other values on the page the same, and choose **Next**.
16. For **Permissions**, select **LabLaunchCFNRole** from the drop-down list.
- NOTE:** You can ignore the warning associated with the role being used for stack operations.
17. Select **Next**.
18. On the **Review** page, check the box labeled **I acknowledge that AWS CloudFormation might create IAM resources**.
19. Choose **Create stack**.
- It will take about 5 minutes for the solution to fully deploy in your account. You can monitor the creation of resources as part of the deployment by periodically selecting the  button on the **Events** tab.
20. Once the Stack status reads **CREATE_COMPLETE**, move on to the next step.

Task 2: Configure Instance Scheduler

When you deploy the AWS CloudFormation template, the solution creates an Amazon DynamoDB table. This table contains sample period rules and schedules that you can use as a reference to create your own custom period rules and schedules. In this task, you will review the default settings that Instance Scheduler provides and create a custom schedule to control the usage of instances.

Task 2.1: Review Periods

Period rules are stored in a DynamoDB table of the base solution for Instance Scheduler. In this task, you will review the default entries in the DynamoDB table.

21. Open **DynamoDB** by selecting **Services** and typing **dynamodb** in the filter box.
22. Choose **DynamoDB**.
23. In the left navigation pane, select **Tables**.
24. Select the link for the **ConfigTable** which will have a name starting with **InstanceScheduler-ConfigTable-...**
25. Select the **Items** tab.

The items you see in the table represent different components that can be used to schedule your AWS resources. You can use the instances provided to support your scheduling requirements or create your own custom schedules as needed.

26. Select the **period** hyperlink for the item named **office-hours**.



The item should be similar to the image above, showing you the start and end times associated with office hours for an organization.

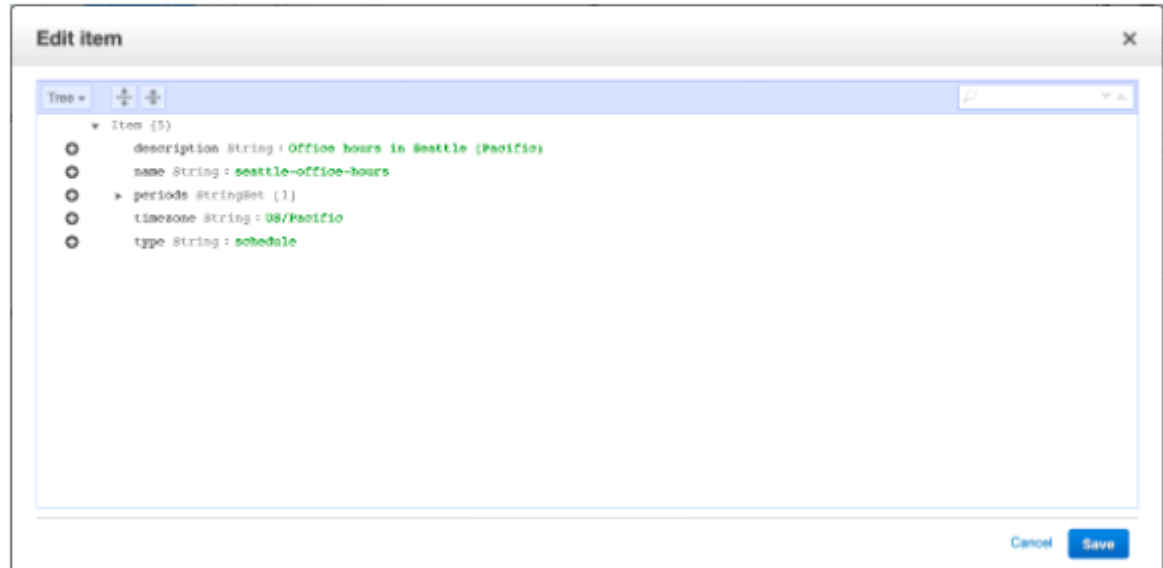
27. Select the **cancel** link in the pop-up.

Feel free to explore some of the other periods that are provided with the base solution.

Task 2.2: Review Schedules

A schedule combines periods with other information to determine when instances should be running. They are stored in a DynamoDB table of the base solution for Instance Scheduler. In this task, you will review the default delivered schedules in the DynamoDB table.

28. Select the **schedule** link with the name **seattle-office-hours**.



The item should be similar to the image above, showing you the schedule name and timezone.

29. Expand the periods attribute by selecting ► **periods**.

You can see that this schedule is leveraging the office-hours period that you just reviewed.

just reviewed.

30. Select the **cancel** link in the pop-up.

31. Select the **schedule** link with the name **stopped**.

You can see that this schedule has an override status of stopped. This schedule can be used when you want to keep your instances in a stopped state for an indefinite period of time.

32. Select the **cancel** link in the pop-up.

Task 2.3: Create Your Own Schedule

You have already reviewed the different components, which are used by Instance Scheduler. In this task, you will define your own schedule based on the office-hours period and your local time zone.

33. Select the row for the **seattle-office-hours** schedule.

34. Choose **Actions** ▼

35. Select **Duplicate** in the dropdown.

36. Set the following values in the **Copy item** window, replacing the values **<YOUR CITY>** and **<YOUR TIME ZONE>** with the relevant values for your current location. For this lab purpose, use the time zone as suggested in the following table based on your lab region.

Item	Value
description	Office hours in <YOUR CITY> (<YOUR TIME ZONE>)
name	<YOUR CITY>-office-hours
timezone	<YOUR TIME ZONE>

For this lab purpose, use the time zone as suggested in the following table based on your lab region.

Region	Time Zone Value
us-east-1, us-east-2	US/Eastern
us-west-1, us-west-2	US/Pacific
ca-central-1	Canada/Central
ap-southeast-1	Asia/Kolkata
ap-southeast-2	Asia/Singapore
ap-northeast-1	Asia/Tokyo
ap-northeast-2	Asia/Seoul

NOTE: You are required to select actual Time Zone to successfully complete the lab. To find the appropriate timezone value, please refer to the list of valid time zones here:

https://en.wikipedia.org/wiki/List_of_tz_database_time_zones and copy and paste the value for your desired timezone from the **TZ database name** column.

37. Choose **Save**

Make note of the new schedule that you have created, as it will be used later in this lab.

Task 3: Review CloudWatch Event Trigger

The Instance Scheduler Lambda function is invoked by a CloudWatch Event Rule that is deployed as part of the provided CloudFormation template. As delivered, the CloudWatch Event Rule is based on a Cron expression which will trigger the Lambda function to run every five minutes. To allow you to see results more quickly during this lab, you will now modify that Cron expression to run every minute.

38. Navigate to **CloudWatch** by selecting **Services ▾** and typing `cloudwatch` in the filter box
39. Choose **CloudWatch**.
40. In the left navigation pane, select **Rules** under **Events**.
41. Select the link for the **SchedulerRule** which will have a name that starts with **InstanceScheduler-SchedulerRule.....**
42. Choose **Actions ▾**
43. Select **Edit** in the drop-down list.
44. Modify the **Cron expression** to `0/1 * * * ? *`

You will see the **Next 10 Trigger Date(s)** update to run every minute.

45. Choose **Configure details**
46. Choose **Update rule**

Now you won't have to wait so long to see results from your scheduling activities, it's time to define the schedule for your individual instances.

Task 4: Define Schedules for Your Instances and review results

When you deployed the AWS CloudFormation template, you defined the name (tag key) for the solution's custom tag. For the Instance Scheduler to recognize an Amazon EC2 or Amazon RDS instance, the tag key on that instance must match the custom tag name stored in the Amazon DynamoDB table. Therefore, it is important that you apply tags consistently and correctly to all applicable instances.

In your lab environment, two instances were provisioned. In this task, you will tag the instances with the **schedule** name that you want applied to them and review the results due to the corresponding changes. For example, you previously reviewed the configuration for the schedule **seattle-office-hours**. For any instance that you would like to configure to run during those hours, the tag key will need to be set to `Schedule` and the tag value set to `seattle-office-hours`.

Task 4.1: Stopping Instances Using the Stopped Schedule

Rather than manually stopping instances when needed, you will move your EC2 instances to a stopped state by creating a new tag and including the desired schedule as the value.

47. Navigate to **EC2** by selecting **Services** and typing `ec2` in the filter box.
48. Choose **EC2**.
49. In the left navigation pane, select **Instances**.
50. Select the first instance in the list.

51. Select the **Tags** tab.

52. Choose **Add/Edit Tags**

53. Choose **Create Tag**

- For the **Key** enter **Schedule**
- For the **Value** enter **stopped**
- Select **Save**

54. Repeat the previous steps for the second instance in the list.

Verify the changed status of EC2 Instances

Within a few moments, you will see your instances move to a **stopped** state. Because the Instance Scheduler was able to match the defined schedule with its configuration table in DynamoDB, Instance Scheduler has stopped the instances.

NOTE: you may have to select the  button at the top of the page to refresh the status of your EC2 instances.

Task 4.2: Review DynamoDB State Table

As part of the Instance Scheduler solution, a DynamoDB table keeps track of the current state of instances being managed by Instance Scheduler. You will now review that table to see the updated state of your EC2 instances.

55. Open **DynamoDB** by selecting **Services ▾** and typing **dynamodb** in the filter box.

56. Choose **DynamoDB**

56. Choose **DynamoDB**.

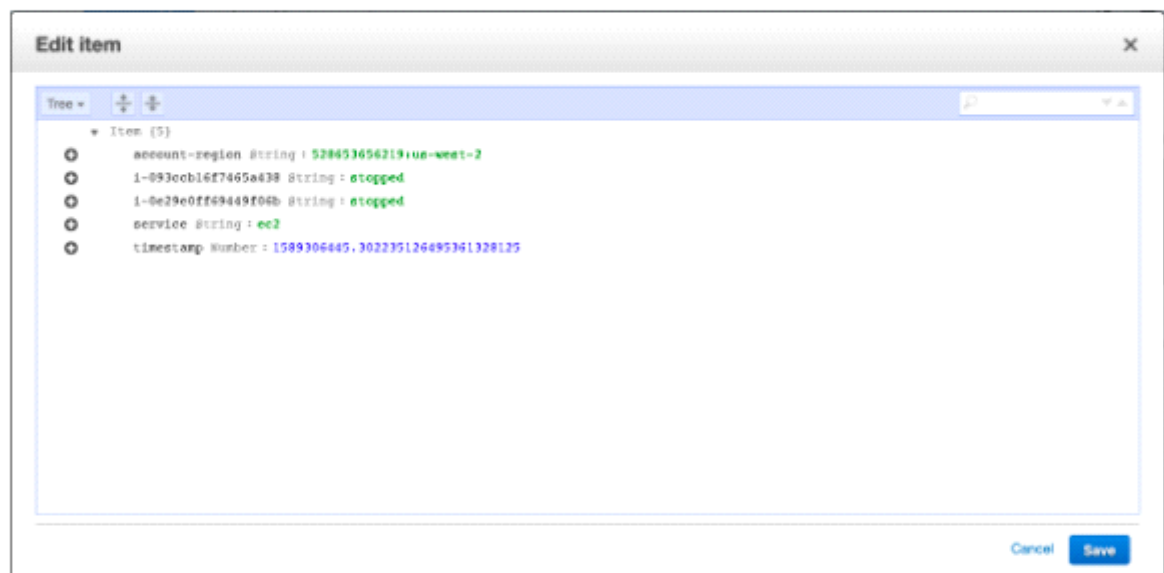
57. In the left navigation pane, select **Tables**.

58. Select the link for the **StateTable** which will have a name starting with **InstanceScheduler-StateTable-...**

59. Select the **Items** tab.

60. Select the **ec2** link.

This item shows you the status of your EC2 instances, in this case, their instance IDs are listed with a state of **stopped** noted in the item. Your item should look similar to the image below.



61. Select the **cancel** link.

NOTE: You may have to refresh the list of DynamoDB table items if you don't see any values listed yet.

Task 4.3: Modify the Schedule on EC2 instances

Now that the EC2 instances are in a stopped state, you will update the **Schedule** tag value to follow the custom schedule that you created in a

previous step.

62. Open **EC2** by selecting **Services ▾** and typing 'ec2' in the filter box.

63. Right click on **EC2** and select **Open link in new tab**.

64. In the left navigation pane, select **Instances**.

65. Select the first instance in the list.

66. Select the **Tags** tab.

67. Select **Manage Tags**

68. Add a new tag by selecting **Add Tag**

69. For key, enter **Schedule**


70. For value, enter the schedule you created in Task 2

<YOUR CITY>-office-hours

71. Select **Save**

72. Repeat the previous steps for the second instance in the list.

Verify the changed status of EC2 instances

Within a few moments, you will see your instances move to a running state. You may have to select the  button at the top of the page to refresh the status of your EC2 instances.

NOTE: If you are performing this lab outside of the office hours for the time zone that you selected in your schedule, you will need to update the **office-hours** period in the **InstanceScheduler-ConfigTable** in DynamoDB as suggested in the task 2.3.


Task 4.4: Review Updated DynamoDB State Table

As part of the Instance Scheduler solution, a DynamoDB table keeps track of the current state of instances being managed by Instance Scheduler. You will again review this table to confirm the current state of your instances.

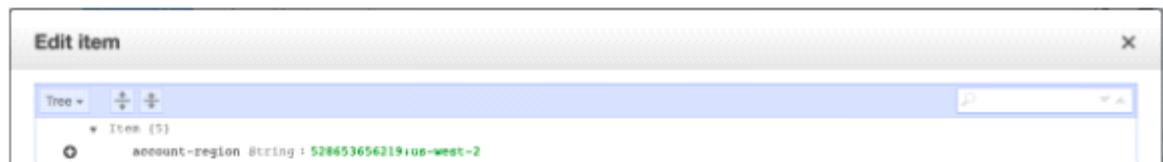
73. Return to your open **DynamoDB** browser tab.

NOTE: If you have closed the tab, you can navigate to it using the directions below.

- Open **DynamoDB** by selecting **Services** and typing **dynamodb** in the filter box.
- Choose **DynamoDB**.
- In the left navigation pane, select **Tables**.
- Select the link for the **StateTable** which will have a name starting with **InstanceScheduler-StateTable-...**
- Select the **Items** tab.
- Select the **ec2** link.

74. Select  to refresh the items in the table.

This item shows you the status of your Amazon EC2 instances and now the instance IDs are listed with a state of **running** in accordance to the seattle-office-hours schedule that has been applied. Your item should look similar to the image below.



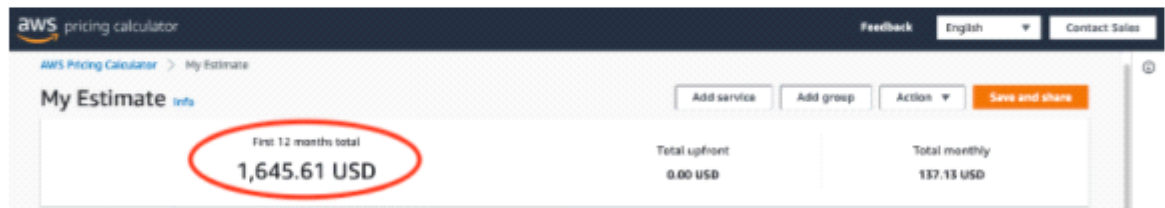


A screenshot of an AWS console dialog box. It contains a list of instance details: two IDs (1-093ecb16f7465a638 and 1-0e29e0ff69449f04b) both with status 'running', a service String 'ec2', and a timestamp Number '1509308770,917041301727294921875'. At the bottom right, there are 'Cancel' and 'Save' buttons.

75. Select the **cancel** link.

Summary

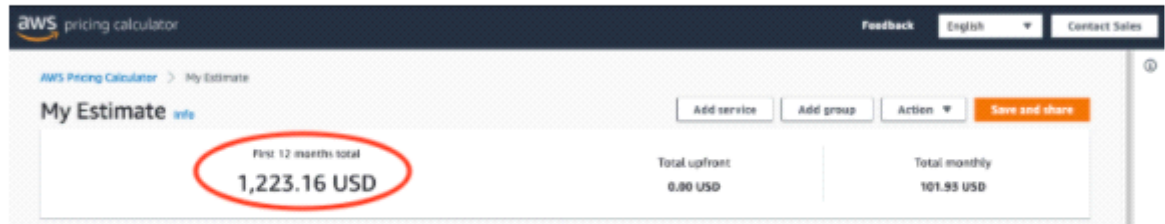
You have configured a schedule for the lab instances to run only during the defined office hours. With this simple solution deployed, the operating costs of the two instances supporting your AP Imaging application would drop by 18% approximately.



The prices are as of 5/12/2020. If you would like to review this estimate in more detail, please select here: <https://calculator.aws/#/estimate?id=1636f51c24e9246946a2ce4190fdbb3ca0e863b4>

To further optimize this solution, however, you should also look at the available pricing options for further cost savings. Savings Plans is a flexible pricing model that helps you save up to 72 percent on Amazon EC2, AWS Fargate, and AWS Lambda usage. Savings Plans provides you lower prices

for your Amazon EC2 usage, Fargate, and Lambda in exchange for a commitment to a consistent usage amount (measured in \$/hour) for a one or three year term. Operating these instances in a three-year, no upfront payment option further reduces the operating costs for these instances resulting in an additional 21% savings.



The prices are as of 5/12/2020. If you would like to review this estimate in more detail, please select here: <https://calculator.aws/#/estimate?id=1364c922762858eefe78651ac318ccbf77f2bad2>

End Lab

Follow these steps to close the console, end your lab, and evaluate the experience.

76. Return to the AWS Management Console.
77. On the navigation bar, choose **awsstudent@<AccountNumber>**, and then choose **Sign Out**.
78. Choose **End Lab**
79. Choose **OK**
80. (Optional):

- Select the applicable number of stars ☆
- Type a comment
- Choose **Submit**

- 1 star = Very dissatisfied
- 2 stars = Dissatisfied
- 3 stars = Neutral
- 4 stars = Satisfied
- 5 stars = Very satisfied

You may close the window if you don't want to provide feedback.

For more information about AWS Training and Certification, see <http://aws.amazon.com/training/>.

Your feedback is welcome and appreciated.

If you would like to share any feedback, suggestions, or corrections, please provide the details in our [AWS Training and Certification Contact Form](#).

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