

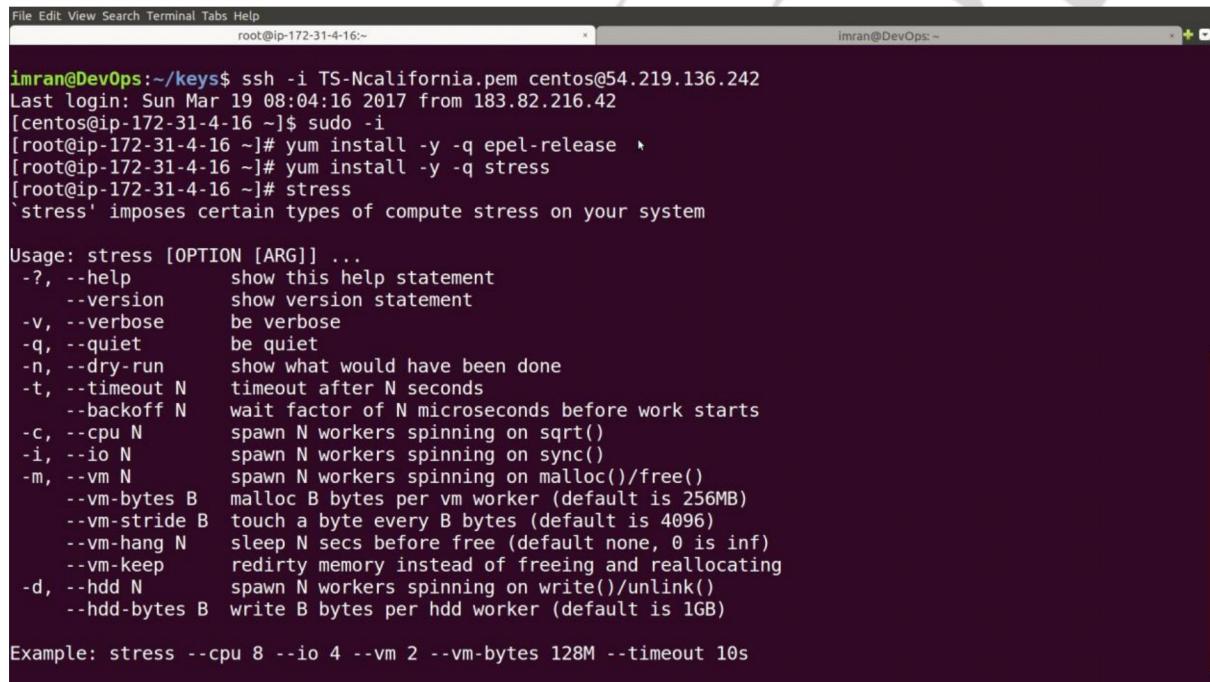
threshold, you can use Auto Scaling to dynamically add or remove EC2 instances or send you a notification.

- **View Graphs and Statistics** - Amazon Cloudwatch Dashboards enable you to create reusable graphs of AWS resources and custom metrics so you can quickly monitor operational status and identify issues at a glance.
- **Monitor and React to Resource Changes** - CloudWatch Events provides a stream of events describing changes to your AWS resources. You can easily build workflows that automatically take actions you define, such as invoking an AWS Lambda function, when an event of interest occurs.

### Monitoring AWS EC2 instance CPU Utilization:

In order to monitor CPU Utilization we need an ec2 instance where we will cause high cpu load and test.

I have created a centos 6 ec2 instance with tag Name: monittest and login to the instance. For testing purpose Install stress tool, which can create a high CPU usage.



```
File Edit View Search Terminal Tabs Help
root@ip-172-31-4-16:~ imran@DevOps:~ root@ip-172-31-4-16:~ imran@DevOps:~ + 

imran@DevOps:~/keys$ ssh -i TS-Ncalifornia.pem centos@54.219.136.242
Last login: Sun Mar 19 08:04:16 2017 from 183.82.216.42
[centos@ip-172-31-4-16 ~]$ sudo -i
[root@ip-172-31-4-16 ~]# yum install -y -q epel-release *
[root@ip-172-31-4-16 ~]# yum install -y -q stress
[root@ip-172-31-4-16 ~]# stress
`stress' imposes certain types of compute stress on your system

Usage: stress [OPTION [ARG]] ...
-?, --help      show this help statement
--version      show version statement
-v, --verbose   be verbose
-q, --quiet     be quiet
-n, --dry-run   show what would have been done
-t, --timeout N timeout after N seconds
--backoff N    wait factor of N microseconds before work starts
-c, --cpu N    spawn N workers spinning on sqrt()
-i, --io N     spawn N workers spinning on sync()
-m, --vm N     spawn N workers spinning on malloc()/free()
--vm-bytes B   malloc B bytes per vm worker (default is 256MB)
--vm-stride B  touch a byte every B bytes (default is 4096)
--vm-hang N    sleep N secs before free (default none, 0 is inf)
--vm-keep       redirty memory instead of freeing and reallocating
-d, --hdd N    spawn N workers spinning on write()/unlink()
--hdd-bytes B  write B bytes per hdd worker (default is 1GB)

Example: stress --cpu 8 --io 4 --vm 2 --vm-bytes 128M --timeout 10s
```

We can check lots of metrics by selecting the instance monitoring tab. All those graphs for CPU, Disk & network usage collected by Cloudwatch monitoring tool by default. You can see data from last hour to last two weeks.

The screenshot shows the AWS CloudWatch Metrics interface. On the left, there's a sidebar with various AWS services like EC2 Dashboard, Events, Tags, Reports, Limits, Instances, Images, Auto Scaling, and Systems Manager. The main content area displays a table of instances with columns for Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS (IPv4), IPv4 Public IP, and IPv6 IPs. One instance, 'monitest' (i-0079cad146bf4fdce), is selected. Below the table, there are tabs for Description, Status Checks, Monitoring (which is active), Tags, and Usage Instructions. The Monitoring section shows CloudWatch metrics for the selected resources. A dropdown menu 'Showing data for:' is open, showing options like Last Hour, Last 2 Hours, Last 6 Hours, Last 12 Hours, Last 24 Hours, Last 3 Days, Last 1 Week, and Last 2 Weeks. Below the dropdown are eight line graphs showing metrics over time from 07:30 to 08:00 on March 19.

Click on CloudWatch service from AWS main dashboard.  
Go to Metrics



#### Alarm Summary

You do not have any alarms created in the US West (N. California) region. Alarms allow you to send notifications or execute Auto Scaling actions in response to any CloudWatch metric.

[Create Alarm](#)

You can now use Amazon CloudWatch alarms to monitor the estimated charges on your AWS bill and receive email alerts whenever charges exceed a threshold you define. Visit the CloudWatch US East (N. Virginia) region to manage your billing alarms.

[Go to CloudWatch US East \(N. Virginia\) region](#)

#### Service Health

Current Status	Details
<span>✓</span> Amazon CloudWatch Service	Service is operating normally <a href="#">View complete service health details</a>

You can see some AWS services available here. Click on Ec2

The screenshot shows the AWS CloudWatch Metrics service page. At the top, there are tabs for All metrics, Graphed metrics, and Graph options. Below that is a search bar. The main area displays a grid of services with their metric counts: ApplicationELB (118 Metrics), Auto Scaling (16 Metrics), EBS (289 Metrics), EC2 (456 Metrics), ELB (56 Metrics), RDS (85 Metrics), S3 (4 Metrics), and others.

There are some metrics available in EC2. Select Per-Instance metrics.

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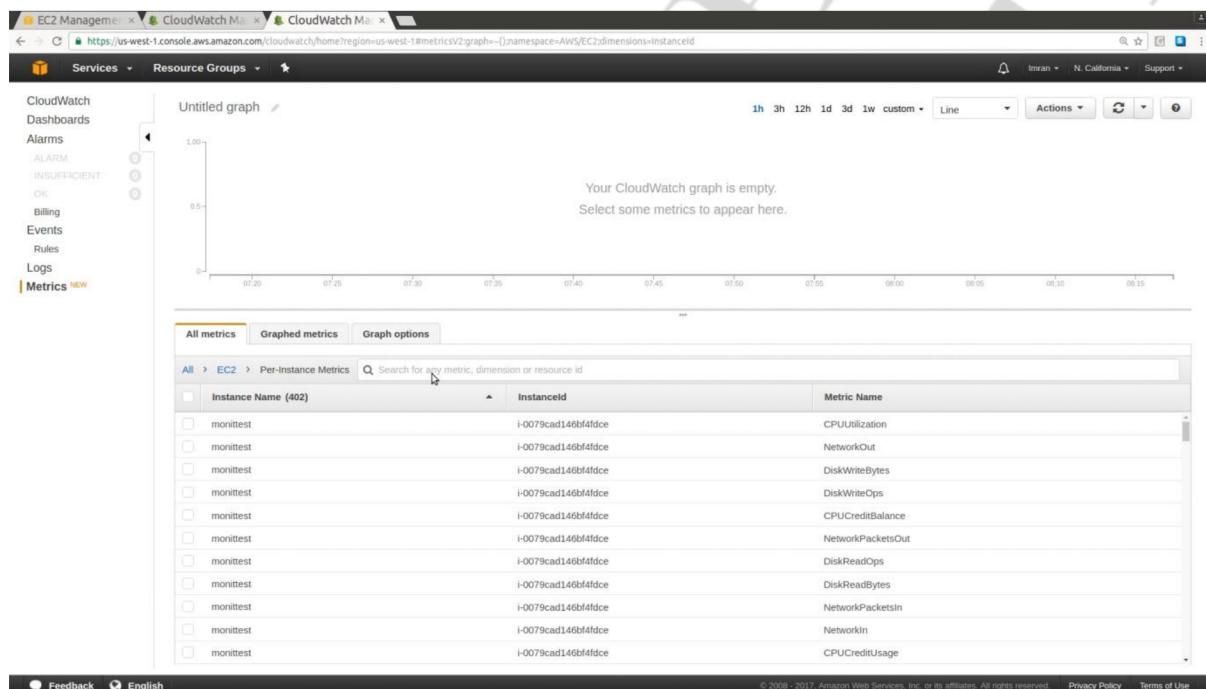
All metrics   Graphed metrics   Graph options

All > EC2  Search for any metric, dimension or resource id

456 Metrics

<a href="#">By Auto Scaling Group</a> 26 Metrics	<a href="#">By Image (AMI) Id</a> 14 Metrics	<a href="#">Per-Instance Metrics</a> 402 Metrics
<a href="#">Aggregated by Instance Type</a> 7 Metrics	<a href="#">Across All Instances</a> 7 Metrics	

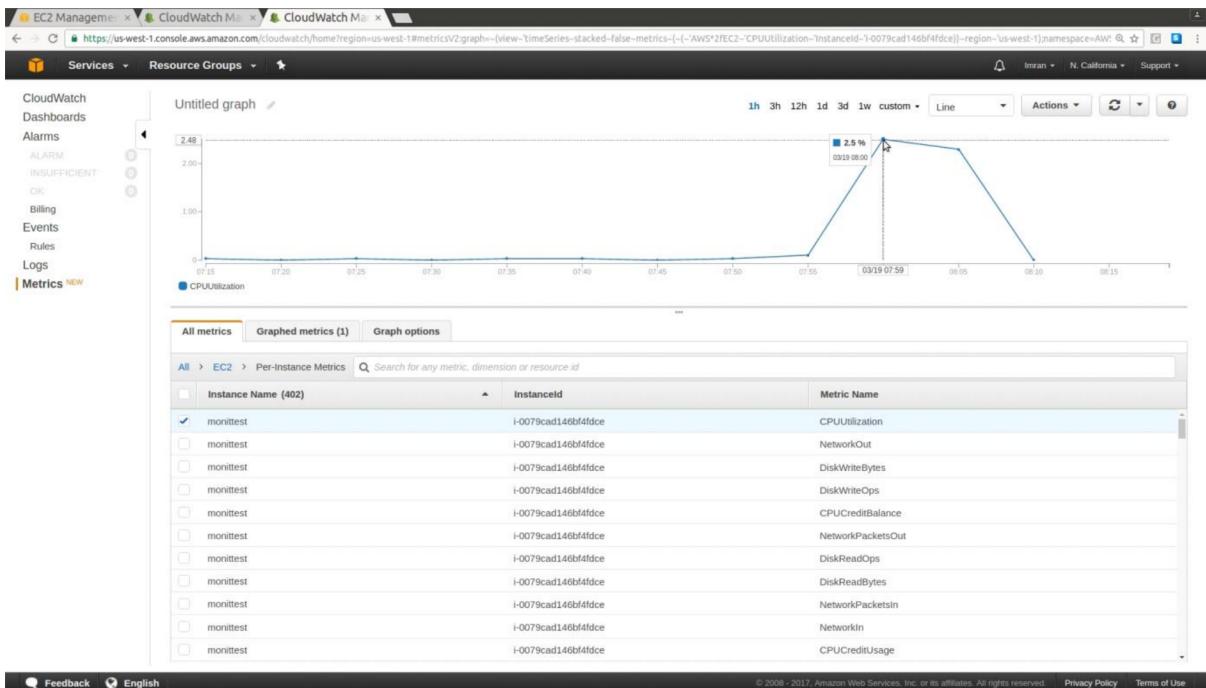
You can see the instance which we created along with the metrics attached to it.



Select the instance monittest with CPU utilization

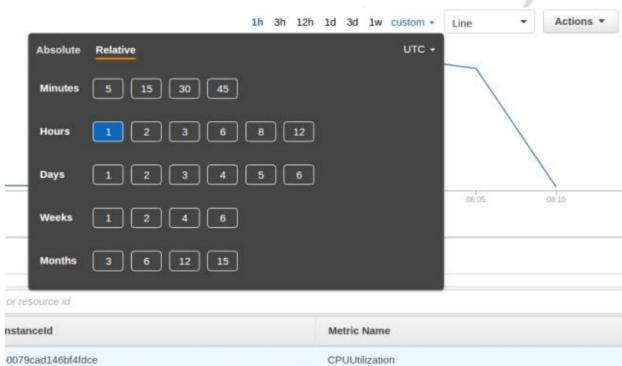
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As you can see above for instance monittest its showing cpu utilization graph for last 1 hour.  
We can customize the graph display.

Click custom and select relative or absolute time to see graph details as per your wish.



Setting up Alarm.

Click on Alarms and select Create Alarm.

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## Create Alarm

1. Select Metric    2. Define Alarm

Browse Metrics  X

EC2 > Per-Instance Metrics

InstanceId	InstanceName	Metric Name
i-0079cad146bf4fdce	monittest	CPUCreditBalance
i-0079cad146bf4fdce	monittest	CPUCreditUsage
i-0079cad146bf4fdce	monittest	CPUUtilization
i-0079cad146bf4fdce	monittest	DiskReadBytes
i-0079cad146bf4fdce	monittest	DiskReadOps
i-0079cad146bf4fdce	monittest	DiskWriteBytes
i-0079cad146bf4fdce	monittest	DiskWriteOps
i-0079cad146bf4fdce	monittest	NetworkIn

Search with instance ID to find all the metrics related to our instance.  
Put a check mark on CPU Utilization against monittest.

1. Select Metric    2. Define Alarm

EC2  X

1 to 14 of 14 metrics

Per-Instance Metrics    By Auto Scaling Group    By Image (AMI) Id    Aggregated by Instance Type    Across All Instances

EC2 > Per-Instance Metrics

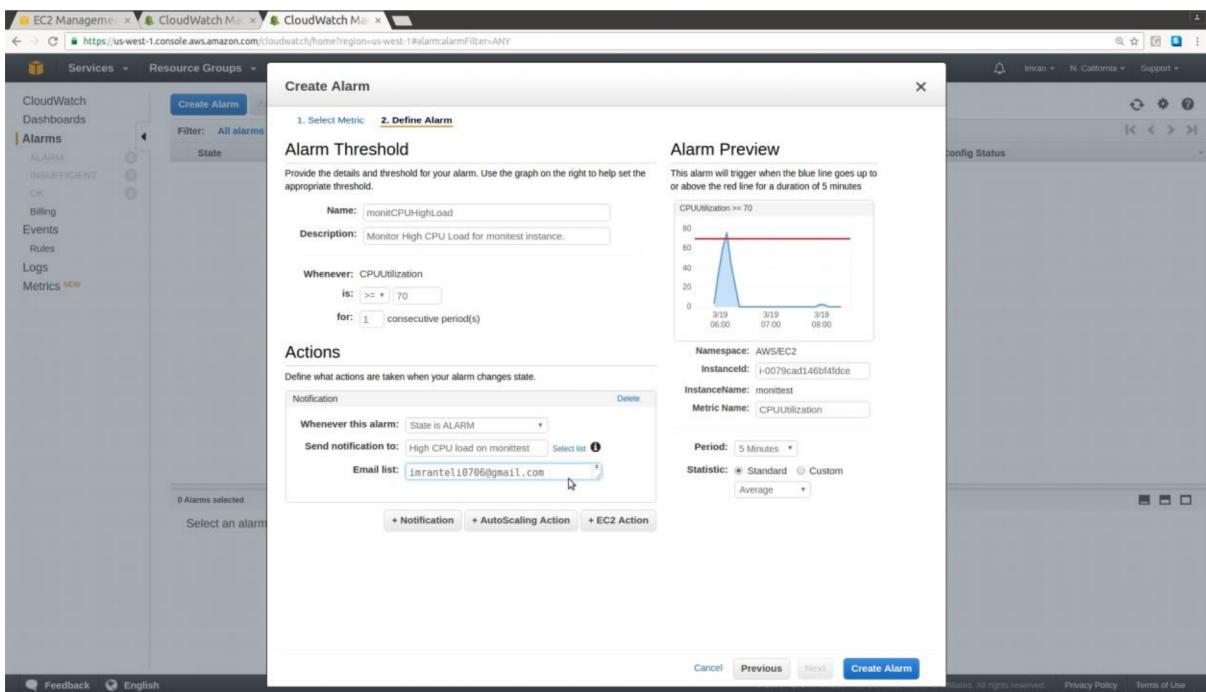
InstanceId	InstanceName	Metric Name
i-0079cad146bf4fdce	monittest	CPUCreditBalance
i-0079cad146bf4fdce	monittest	CPUCreditUsage
<input checked="" type="checkbox"/> i-0079cad146bf4fdce	monittest	CPUUtilization

Click on next. You have to give some details related to threshold and provide some name and description to alarm.

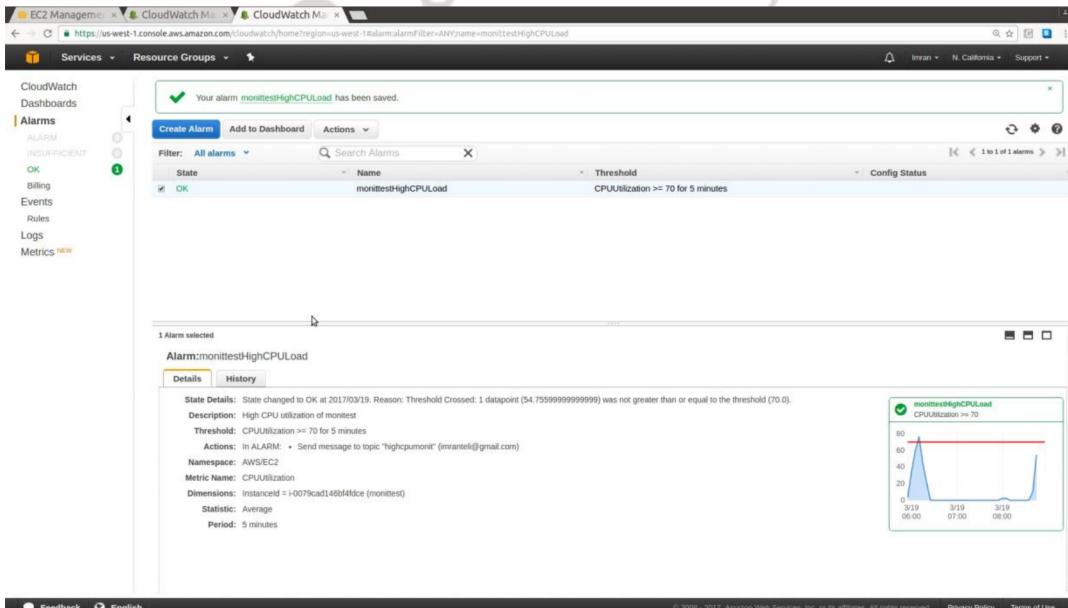
In the actions section you have to specify the email id to which the notification to be received. Click Create Alarm, once done.

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You will get an email from AWS for verifying email address, once its verified you will start receiving email alert whenever the instance cpu load crosses beyond 70 %.  
Alarm has been created successfully for monittest instance.



To test that we can use stress utility and cause high cpu on our instance. For this follow the commands shown in the below screenshot.

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```
root@ip-172-31-4-16:~# uptime
 08:43:43 up 2:47, 2 users, load average: 0.00, 0.00, 0.00
root@ip-172-31-4-16:~# stress --cpu 90 -v --timeout 300
```

```
stress: dbug: [5638] --> hogcpu worker 10 [5719] forked
stress: dbug: [5638] using backoff sleep of 27000us
stress: dbug: [5638] setting timeout to 180s
stress: dbug: [5638] --> hogcpu worker 9 [5720] forked
stress: dbug: [5638] using backoff sleep of 24000us
```

Login from another tab and run top command to see it real time from the system.

```
imran@DevOps:~/keys$ ssh -i TS-Ncalifornia.pem centos@54.219.136.242
Last login: Sun Mar 19 08:39:07 2017 from 183.82.216.42
[centos@ip-172-31-4-16 ~]$ sudo -i
[root@ip-172-31-4-16 ~]# top
```

Top command shows the current load average, running, sleeping and stopped processes of the system.

```
top - 08:47:14 up 2:51, 3 users, load average: 4.17, 4.86, 2.11
Tasks: 79 total, 1 running, 78 sleeping, 0 stopped, 0 zombie
Cpu(s): 0.0%us, 0.0%sy, 0.0%ni, 100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 1018504k total, 276764k used, 741740k free, 10700k buffers
Swap: 0k total, 0k used, 0k free, 161204k cached
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1	root	20	0	19232	1488	1224	S	0.0	0.1	0:01.46	init
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	RT	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
4	root	20	0	0	0	0	S	0.0	0.0	0:00.01	ksoftirqd/0
5	root	RT	0	0	0	0	S	0.0	0.0	0:00.00	stopper/0
6	root	RT	0	0	0	0	S	0.0	0.0	0:00.01	watchdog/0
7	root	20	0	0	0	0	S	0.0	0.0	0:00.42	events/0
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	events/0
9	root	20	0	0	0	0	S	0.0	0.0	0:00.00	events_long/0
10	root	20	0	0	0	0	S	0.0	0.0	0:00.00	events_power_ef
11	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cgroup
12	root	20	0	0	0	0	S	0.0	0.0	0:00.00	khelper
13	root	20	0	0	0	0	S	0.0	0.0	0:00.00	netns
14	root	20	0	0	0	0	S	0.0	0.0	0:00.00	async/mgr
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00	pm
16	root	20	0	0	0	0	S	0.0	0.0	0:00.00	xenwatch
17	root	20	0	0	0	0	S	0.0	0.0	0:00.00	xenbus
18	root	20	0	0	0	0	S	0.0	0.0	0:00.02	sync_supers
19	root	20	0	0	0	0	S	0.0	0.0	0:00.02	bdi-default
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kintegrityd/0
21	root	20	0	0	0	0	S	0.0	0.0	0:00.08	kblockd/0
22	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kacpid

Observe the load average, if it is above 80 then all the processes are stressed.

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```

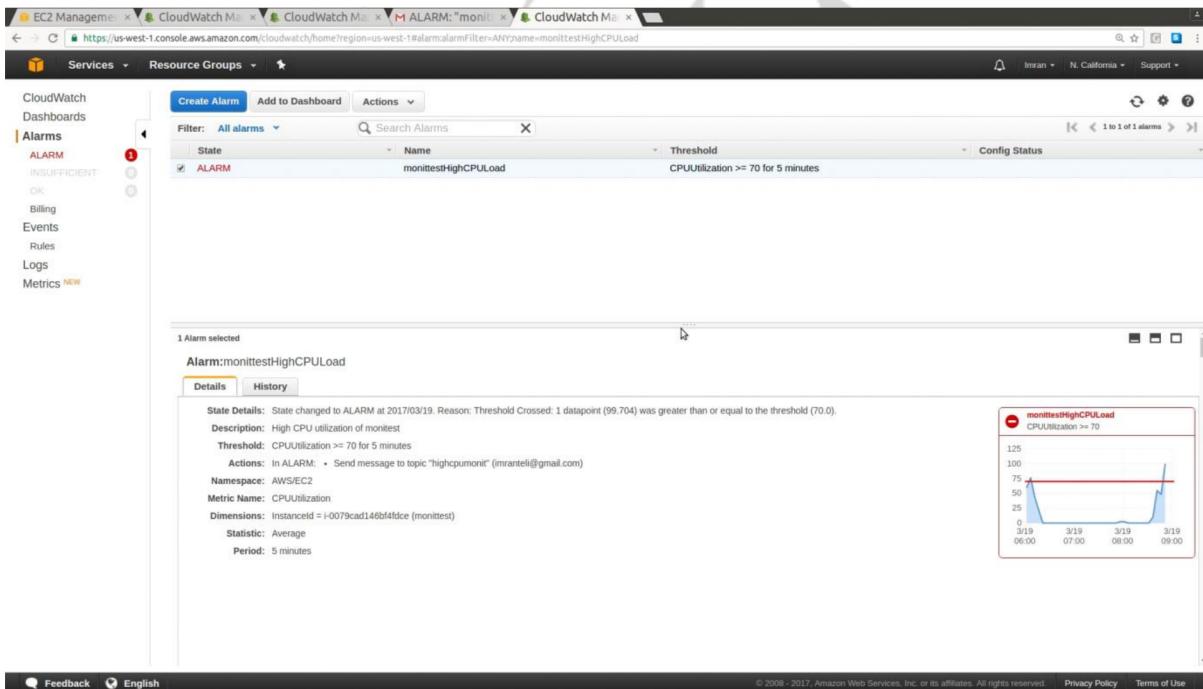
File Edit View Search Terminal Tabs Help
root@ip-172-31-4-16:~ root@ip-172-31-4-16:~
top - 08:50:47 up 2:54, 3 users, load average: 82.75, 37.89, 15.09
Tasks: 170 total, 91 running, 79 sleeping, 0 stopped, 0 zombie
Cpu(s): 99.7%us, 0.3%sy, 0.0%ni, 0.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 1018504k total, 288148k used, 730356k free, 10732k buffers
Swap: 0k total, 0k used, 0k free, 161204k cached

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
5639 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5640 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5641 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5642 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5643 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
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5648 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5649 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5650 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5651 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5652 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
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5656 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5657 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5658 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5659 root 20 0 6516 188 100 R 1.0 0.0 0:01.67 stress
5660 root 20 0 6516 188 100 R 1.0 0.0 0:01.70 stress

```

After few minutes you will receive an email in your inbox which shows Alarm and graph in red colour.

It also gives an indication on alarm dashboard that the CPU utilization  $\geq 70$  for 5 minutes.



Email from AWS

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## ALARM: "monittestHighCPULoad" in US West - N. California

AWS Notifications no-reply@sns.amazonaws.com via amazonsns.com  
to me ▾

You are receiving this email because your Amazon CloudWatch Alarm "monitest" in California region has entered the ALARM state, because "Threshold Crossed: 1 equal to the threshold (70.0)." at "Sunday 19 March, 2017 09:01:21 UTC".

View this alarm in the AWS Management Console:  
<https://console.aws.amazon.com/cloudwatch/home?region=us-west-1#s=Alarm>

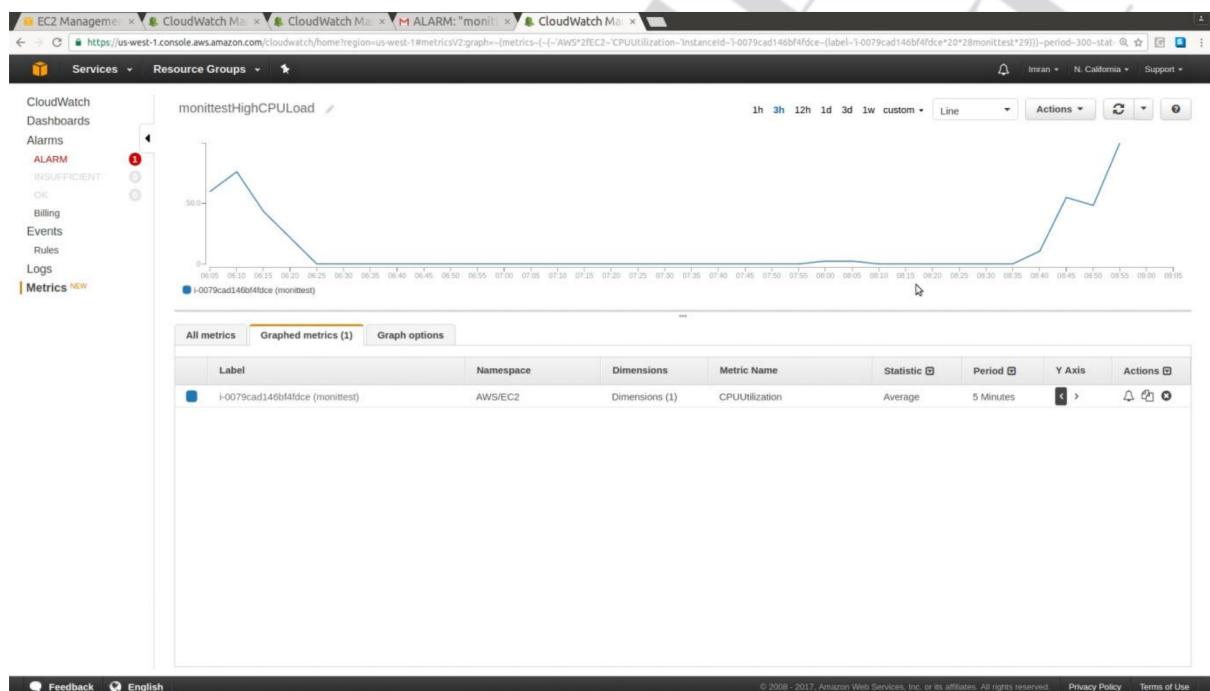
Alarm Details:

- Name: monittestHighCPULoad
- Description: High CPU utilization of monitest
- State Change: OK → ALARM
- Reason for State Change: Threshold Crossed: 1 datapoint (99.704) was greater than or equal to the threshold (70.0).
- Timestamp: Sunday 19 March, 2017 09:01:21 UTC
- AWS Account: 171225278948

Threshold:

- The alarm is in the ALARM state when the metric is GreaterThanOrEqualToThreshold.

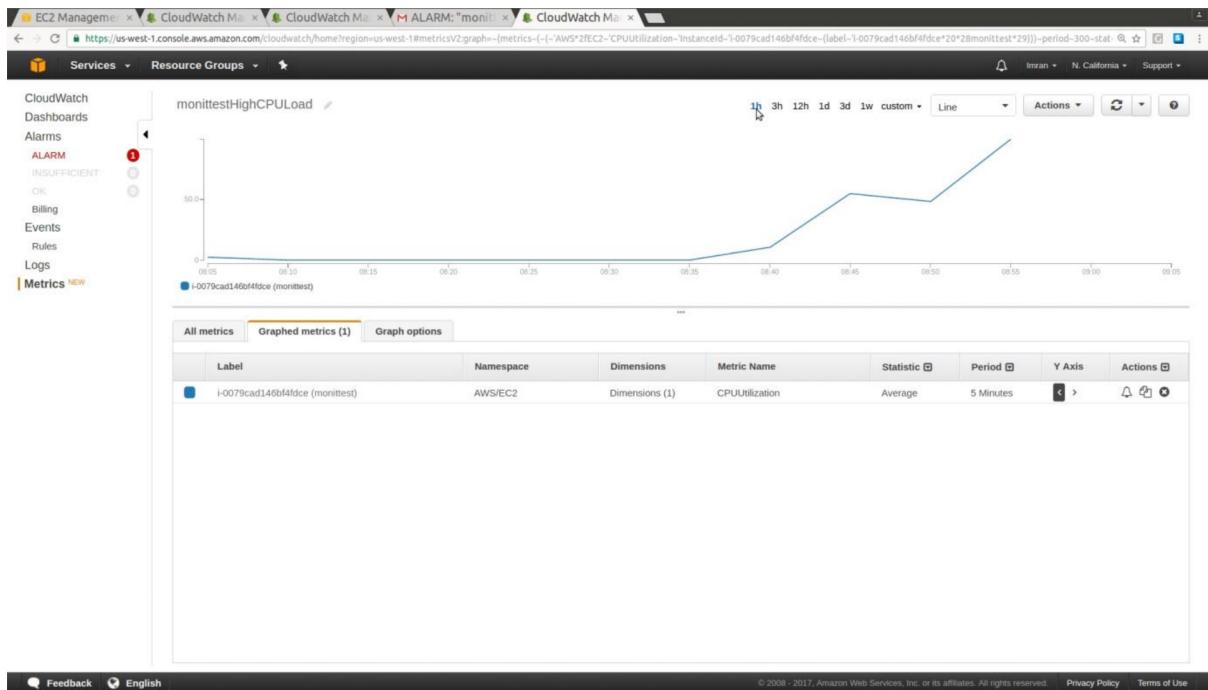
## Graph for our CPU Utilization last 3 hours.



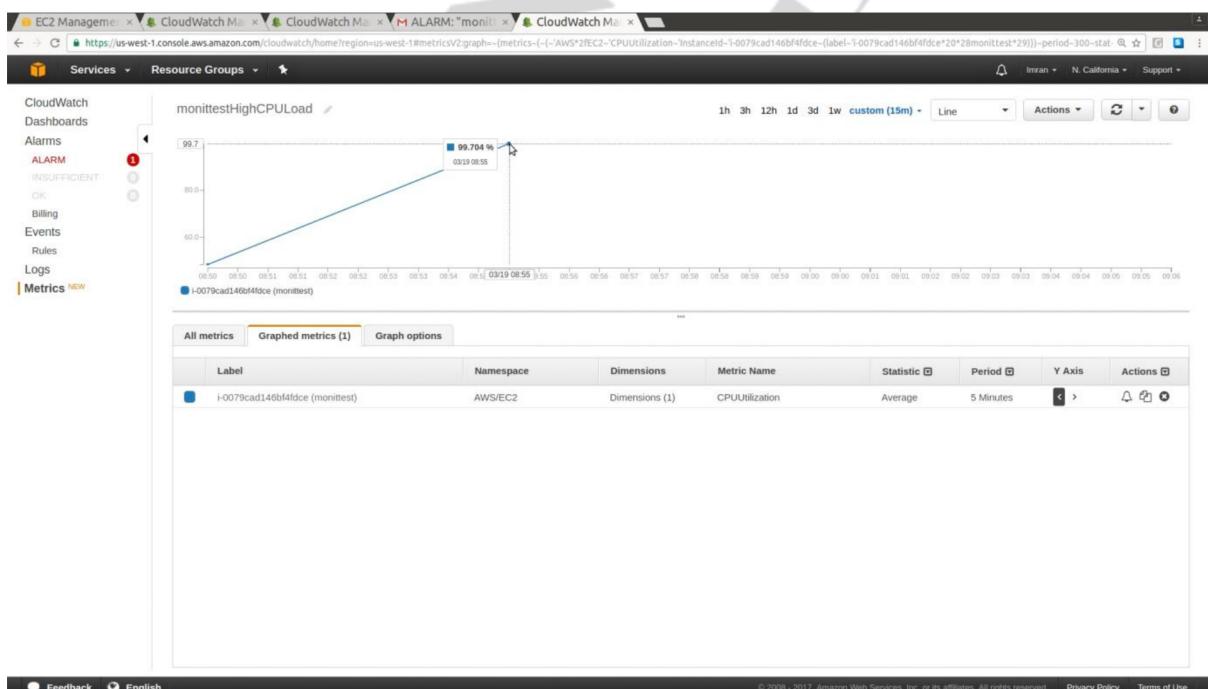
## Graph for our CPU Utilization last 1 hour.

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Graph for our CPU Utilization last 15 minues.



You can also change/add the actions of alarms like EC2 actions to stop/reboot/terminate instance.

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