

CS 553 Cloud Computing
Programming Assignment 3
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CloudKon Clone with Amazon EC2 , S3 , SQS and DynamoDB

Performance Evaluation Report

Introduction:

The report gives the performance evaluation of implementation of a distributed task execution framework on Amazon EC2 using the SQS. Here the architecture of consumer producer is used where the clients are used to collect the tasks and push it to SQS while the worker pulls up the task from SQS and executes it. Also the reverse workflow is done where the worker after execution of each task updates the process queue in the SQS.

The experiments are performed using the system with the mentioned configuration,

System Configuration:

- Operating System: UBUNTU 14.04(Dual Boot)
- Model: Intel(R) Core(TM) i5-4210U CPU @ 1.70GHz
- RAM: 8GB

Programming Specification:

- Instance Type: Amazon EC2 t2.micro
- Programming Language: Python
- Boto API for using Amazon SQS Services.
- SQS Queue: MY_QUEUE (to store the workload tasks)
PROCESS_QUEUE (to store the processed tasks from the task queue)
- DynamoDB – with 20 read and write operations.

Experimental Evaluation

Installer Client & Worker:

The experiments are performed using the client and the worker scripts. The main job of client is to read the tasks line by line from the input workload file and transfer it to SQS. The worker connects to the SQS Queue and executes each task. The executed task is copied to the Process Queue from where the client cant pull up and get the information of the process tasks.

To connect to the SQS service, we use the boto : A python interface to amazon web services.

Using the boto API for EC2 , SQS and Dynamo we have implemented a architecture similar to cloud watch monitoring architecture.

The source code folder contains all the scripts and bash files required to run the client worker application.

Mentioned below are the screenshots and steps that were followed to run the application.

- Start your amazon t2.micro instance and copy your client worker files .
- Install pip to run packages written in our python code.

```
sudo python get-pip.py
```

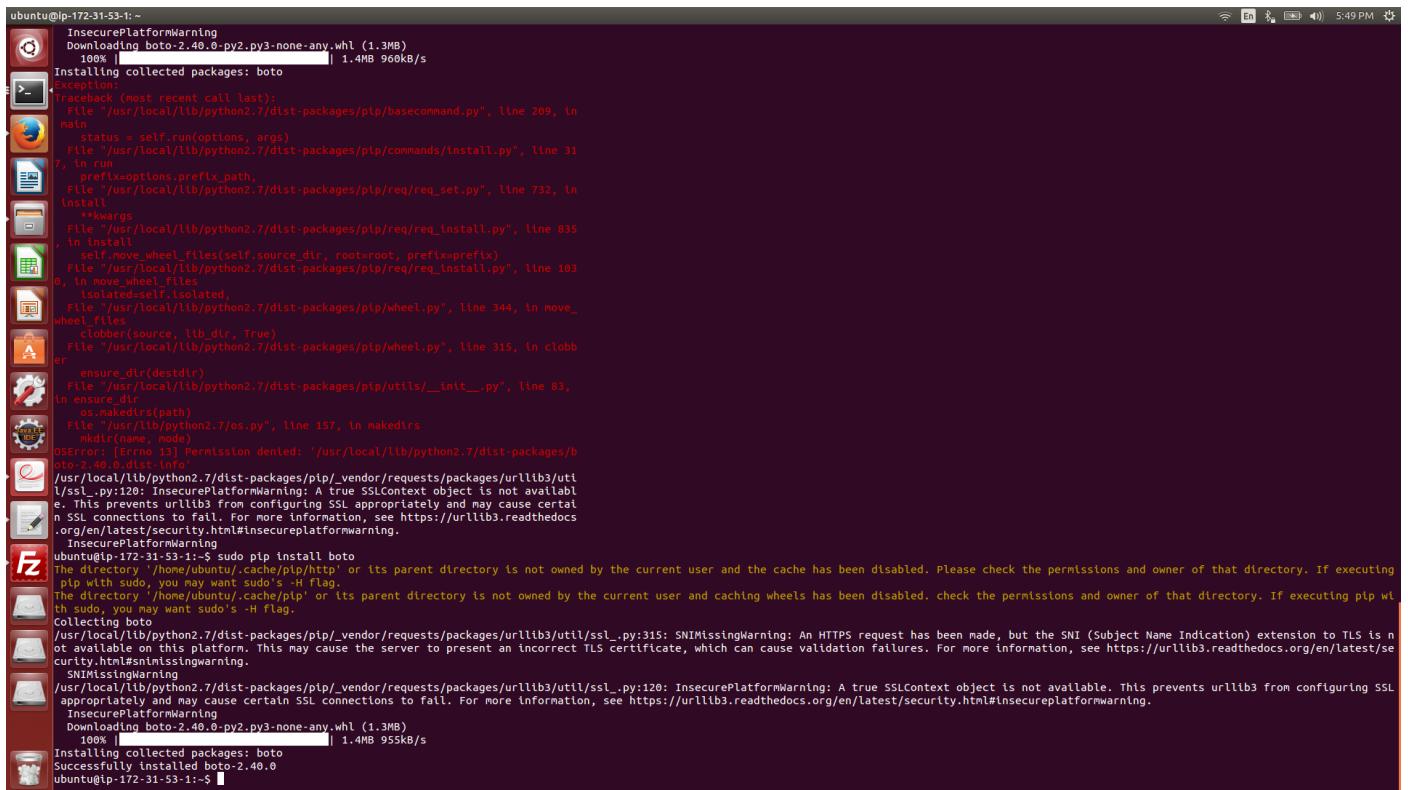
Below is the screenshot to install boto and pip installer.

```
ubuntu@ip-172-31-62-205:~  
% Total    % Received % Xferd  Average Speed   Time   Time  Current  
          Dload  Upload Total Spent   Left Speed  
100 1487k  100 1487k  0     0  4191k  0:--::--:--:--:--:--:-- 4189k  
ubuntu@ip-172-31-62-205:~ sudo python get-pip.py  
The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.  
The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip wl th sudo, you may want sudo's -H flag.  
Collecting pip  
  /tmp/tmpen39vf/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:315: SNIMissingWarning: An HTTPS request has been made, but the SNI (Subject Name Indication) extension to TLS is not available on this platform. This may cause the server to present an incorrect TLS certificate, which can cause validation failures. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#snimissingwarning.  
  /tmp/tmpen39vf/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately a nd may cause certain SSL connections to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.  
    Downloading pip-0.1.1-py2.py3-none-any.whl (1.2MB)  
      100% [=====] | 1.2MB 1.1MB/s  
Collecting setuptools  
  Downloading setuptools-20.10.1-py2.py3-none-any.whl (509kB)  
    100% [=====] | 512KB 2.0MB/s  
Collecting wheel  
  Downloading wheel-0.29.0-py2.py3-none-any.whl (66kB)  
    100% [=====] | 71KB 12.0MB/s  
Installing collected packages: pip, setuptools, wheel  
Successfully installed pip-0.1.1 setuptools-20.10.1 wheel-0.29.0  
/tmp/tmpen39vf/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately a nd may cause certain SSL connections to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.  
ubuntu@ip-172-31-62-205:~ sudo pip install boto  
The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.  
The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip wl th sudo, you may want sudo's -H flag.  
Collecting boto  
  /usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:315: SNIMissingWarning: An HTTPS request has been made, but the SNI (Subject Name Indication) extension to TLS is n ot available on this platform. This may cause the server to present an incorrect TLS certificate, which can cause validation failures. For more information, see https://urllib3.readthedocs.org/en/latest/se curity.html#snimissingwarning.  
  /usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.  
    InsecurePlatformWarning  
    Downloading boto-2.40.0-py2.py3-none-any.whl (1.3MB)  
      100% [=====] | 1.4MB 985kB/s  
Installing collected packages: boto  
Successfully installed boto-2.40.0  
/usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.  
InsecurePlatformWarning  
ubuntu@ip-172-31-62-205:~ ll  
total 1520  
drwxr-xr-x  4 ubuntu ubuntu  4096 Apr  30 23:10 ./  
drwxr-xr-x  3 root   root   4096 Apr  30 23:08 ../  
-rw-r--r--  1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout  
-rw-r--r--  1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc  
drwx----- 2 ubuntu ubuntu  4096 Apr  30 23:09 .cache/  
-rw-rw-r--  1 ubuntu ubuntu 3913 Apr  30 23:10 client.py  
-rw-rw-r--  1 ubuntu ubuntu 1522812 Apr  30 23:10 get-pip.py  
-rw-r--r--  1 ubuntu ubuntu  675 Apr  9 2014 .profile  
drwxr-xr-x  2 ubuntu ubuntu  4096 Apr  30 22:42 .ssh/  
-rw-rw-r--  1 ubuntu ubuntu 1024 Apr  30 22:42 bootstrap_worker.py  
ubuntu@ip-172-31-62-205:~
```

Worker :

```
ubuntu@ip-172-31-53-1:~  
ubuntu@ip-172-31-53-1:~ clear  
total 32  
drwxr-xr-x  4 ubuntu ubuntu  4096 Apr  30 22:47 ./  
drwxr-xr-x  3 root   root   4096 Apr  30 22:42 ../  
-rw-r--r--  1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout  
-rw-r--r--  1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc  
drwx----- 2 ubuntu ubuntu  4096 Apr  30 22:43 .cache/  
-rw-r--r--  1 ubuntu ubuntu 675 Apr  9 2014 .profile  
drwxr-xr-x  2 ubuntu ubuntu  4096 Apr  30 22:42 .ssh/  
-rw-rw-r--  1 ubuntu ubuntu 1024 Apr  30 22:42 bootstrap_worker.py  
ubuntu@ip-172-31-53-1:~ curl -O https://bootstrap.pypa.io/get-pip.py  
% Total    % Received % Xferd  Average Speed   Time   Time  Current  
          Dload  Upload Total Spent   Left Speed  
100 1487k  100 1487k  0     0  4399k  0:--::--:--:--:--:-- 4412k  
ubuntu@ip-172-31-53-1:~ sudo python get-pip.py  
The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owne d by the current user and the cache has been disabled. Please check the perm issions and owner of that directory. If executing pip with sudo, you may want sudo's -H flag.  
The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip wl th sudo, you may want sudo's -H flag.  
Collecting pip  
  /tmp/tmpub34qt/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:315: S NIMissingWarning: An HTTPS request has been made, but the SNI (Subject Name Indi cation) extension to TLS is not available on this platform. This may cause the s erver to present an incorrect TLS certificate, which can cause validation failure s. For more information, see https://urllib3.readthedocs.org/en/latest/security .html#snimissingwarning.  
  /tmp/tmpub34qt/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: I nsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connection s to fail. For more information, see https://urllib3.readthedocs.org/en/latest/s ecurity.html#insecureplatformwarning.  
    Downloading pip-0.1.1-py2.py3-none-any.whl (1.2MB)  
      100% [=====] | 1.2MB 1.1MB/s  
Collecting setuptools  
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Installing collected packages: pip, setuptools, wheel  
Successfully installed pip-0.1.1 setuptools-20.10.1 wheel-0.29.0  
/tmp/tmpub34qt/pip.zip/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: In securePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL appropriately and may cause certain SSL connection s to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.  
ubuntu@ip-172-31-53-1:~ pip install boto  
Collecting boto  
  /usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:315: SNIMissingWarning: An HTTPS request has been made, but the SNI (S ubject Name Indication) extension to TLS is not available on this platform. This may cause the server to present an incorrect TLS certificate, which can cause v
```

Download the same packages and API on the worker instances as well.



```
ubuntu@ip-172-31-53-1:~$ InsecurePlatformWarning
  Downloading boto-2.40.0-py2.py3-none-any.whl (1.3MB)
    100% [=====] 1.4MB 960KB/s
Installing collected packages: boto
Exception:
Traceback (most recent call last):
  File "/usr/local/lib/python2.7/dist-packages/pip/basecommand.py", line 209, in main
    status = self.run(options, args)
  File "/usr/local/lib/python2.7/dist-packages/pip/commands/install.py", line 31
    7, in run
      prefix=options.prefix_path,
  File "/usr/local/lib/python2.7/dist-packages/pip/req/req_set.py", line 732, in install
    **kwargs
  File "/usr/local/lib/python2.7/dist-packages/pip/req/req_install.py", line 835
    , in install
      _move_wheel_files(self.source_dir, root=root, prefix=prefix)
  File "/usr/local/lib/python2.7/dist-packages/pip/req/req_install.py", line 103
    0, in _move_wheel_files
      isolated=self.isolated,
  File "/usr/local/lib/python2.7/dist-packages/pip/wheel.py", line 344, in move_
    wheel_files
    _clobber(source, lib_dir, True)
  File "/usr/local/lib/python2.7/dist-packages/pip/wheel.py", line 315, in clobbe
    r
    ensure_dir(destdir)
  File "/usr/local/lib/python2.7/dist-packages/pip/utils/__init__.py", line 83,
  in ensure_dir
    os.makedirs(path)
  File "/usr/lib/python2.7/os.py", line 157, in makedirs
    mkdir(name, mode)
OSError: [Errno 13] Permission denied: '/usr/local/lib/python2.7/dist-packages/b
oto-2.40.0.dist-info'
/usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util
/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not availabl
e. This prevents urllib3 from configuring SSL appropriately and may cause certai
n SSL connections to fail. For more information, see https://urllib3.readthedocs.
org/en/latest/security.html#insecureplatformwarning.
InsecurePlatformWarning
ubuntu@ip-172-31-53-1:~$ sudo pip install boto
The directory '/home/ubuntu/.cache/pip/http' or its parent directory is not owned by the current user and the cache has been disabled. Please check the permissions and owner of that directory. If executing
pip with sudo, you may want sudo's -H flag.
The directory '/home/ubuntu/.cache/pip' or its parent directory is not owned by the current user and caching wheels has been disabled. check the permissions and owner of that directory. If executing pip wi
th sudo, you may want sudo's -H flag.
Collecting boto
  /usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:315: SNIMissingWarning: An HTTPS request has been made, but the SNI (Subject Name Indication) extension to TLS is n
ot available on this platform. This may cause the server to present an incorrect TLS certificate, which can cause validation failures. For more information, see https://urllib3.readthedocs.org/en/latest/se
curity.html#snimissingwarning.
  SNIMissingWarning
  /usr/local/lib/python2.7/dist-packages/pip/_vendor/requests/packages/urllib3/util/ssl_.py:120: InsecurePlatformWarning: A true SSLContext object is not available. This prevents urllib3 from configuring SSL
appropriately and may cause certain SSL connections to fail. For more information, see https://urllib3.readthedocs.org/en/latest/security.html#insecureplatformwarning.
  InsecurePlatformWarning
  Downloading boto-2.40.0-py2.py3-none-any.whl (1.3MB)
    100% [=====] 1.4MB 955kB/s
Installing collected packages: boto
Successfully installed boto-2.40.0
ubuntu@ip-172-31-53-1:~$
```

The client script can be ran through the below command

```
python client.py -s MY_QUEUE -t {no_of_threads} -w {workload_filename}
```

The worker script can be ran through the below command

```
python worker.py -s MY_QUEUE -t {no_of_threads}
```

Below is the screenshot of the running worker script.

When the worker is ran , it starts listening to the tasks that are present in the MY_QUEUE and as soon as the tasks are present and pushed into the queue from the client script, it starts executing the tasks.

Animoto Clone :

This web application will convert images into videos and the application uses ffmpeg which is software package containing libraries and utilities for encoding and decoding, converting audio video files. The ffmpeg application can be downloaded through below command,

```
wget http://ffmpeg.gusari.org/static/64bit/ffmpeg.static.64bit.latest.tar.gz
```

```
tar -xzvf ffmpeg.static.64bit.latest.tar.gz
```

The version installed can be confirmed using the below command,

```
./ffmpeg -version
```

All the above command outputs have been shown in the below screenshots.

```

ubuntu@ip-172-31-53-1:~$ wget http://ffmpeg.gusari.org/static/64bit/ffmpeg.static.64bit.latest.tar.gz
--2016-04-30 23:04:58-- http://ffmpeg.gusari.org/static/64bit/ffmpeg.static.64bit.latest.tar.gz
Resolving ffmpeg.gusari.org (ffmpeg.gusari.org)... 176.106.121.30
Connecting to ffmpeg.gusari.org (ffmpeg.gusari.org)|176.106.121.30|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 18083076 (17M) [application/x-gzip]
Saving to: 'ffmpeg.static.64bit.latest.tar.gz'

100%[=====] 18,083,076  4.94MB/s  in 3.7s

2016-04-30 23:05:03 (4.63 MB/s) - 'ffmpeg.static.64bit.latest.tar.gz' saved [18083076/18083076]

ubuntu@ip-172-31-53-1:~$ tar -xvf ffmpeg.static.64bit.latest.tar.gz
ubuntu@ip-172-31-53-1:~$ ffmpeg -version
ffmpeg version N-63893-gc9ddef
built on Jul 10 2014 05:38:01 with gcc 4.6 (Debian 4.6.3-1)
configuration: --prefix=/usr/local/ffmpeg-static/64bit --extra-cflags=-I/root/ffmpeg-static/64bit/include --static --extra-ldflags=-L/root/ffmpeg-static/64bit/lib --static --extra-libes=lxnl2 -lxml2 -lexpat -lfreetype --enable-static --disable-shared --enable-ffserver --disable-doc --enable-bzlib --enable-zlib --enable-postproc --enable-runtime-cpudetect --enable-libz264 --enable-gpl --enable-libtheora --enable-libvorbis --enable-libmp3lame --enable-gray --enable-libass --enable-libfreetype --enable-libopenjpeg --enable-libspeex --enable-libvo-aacenc --enable-libvo-amrwbenc --enable-version3 --enable-libvpx
libavutil 52. 89.100 / 52. 89.100
libavcodec 55. 66.101 / 55. 66.101
libavformat 55. 43.100 / 55. 43.100
libavdevice 55. 13.101 / 55. 13.101
libavfilter 4. 8.100 / 4. 8.100
libavresample 0. 1.100 / 0. 1.100
libavpostproc 52. 3.100 / 52. 3.100
ubuntu@ip-172-31-53-1:~$ 

```

Dynamo Table :

The ‘Dynamo_Table’ is created to NOSQL cloud database is created to get guarantee that SQS messages are delivered exactly once.

In the experiments , the Primary Key to ensure unique IDs is task_id.

The number of reads and writes used are 10.

Create DynamoDB table

DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

Table name*	<input type="text" value="Dynamo_Table"/>	Tutorial	?										
Primary key*	Partition key												
	<input type="text" value="task_id"/> String												
<input type="checkbox"/> Add sort key													
Table settings													
Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.													
<input type="checkbox"/> Use default settings													
Secondary indexes													
<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Partition key</th> <th>Sort key</th> <th>Projected Attributes</th> </tr> </thead> <tbody> <tr> <td colspan="5">+ Add index</td> </tr> </tbody> </table>				Name	Type	Partition key	Sort key	Projected Attributes	+ Add index				
Name	Type	Partition key	Sort key	Projected Attributes									
+ Add index													
Provisioned capacity													
Read capacity units	<input type="text" value="10"/> Table												
Write capacity units	<input type="text" value="10"/> Table												
Estimated cost \$5.81 / month (Capacity calculator)													
Additional charges may apply if you exceed the AWS Free Tier levels for CloudWatch or Simple Notification Service. Advanced alarm settings are available in the CloudWatch management console.													
Cancel		Create											

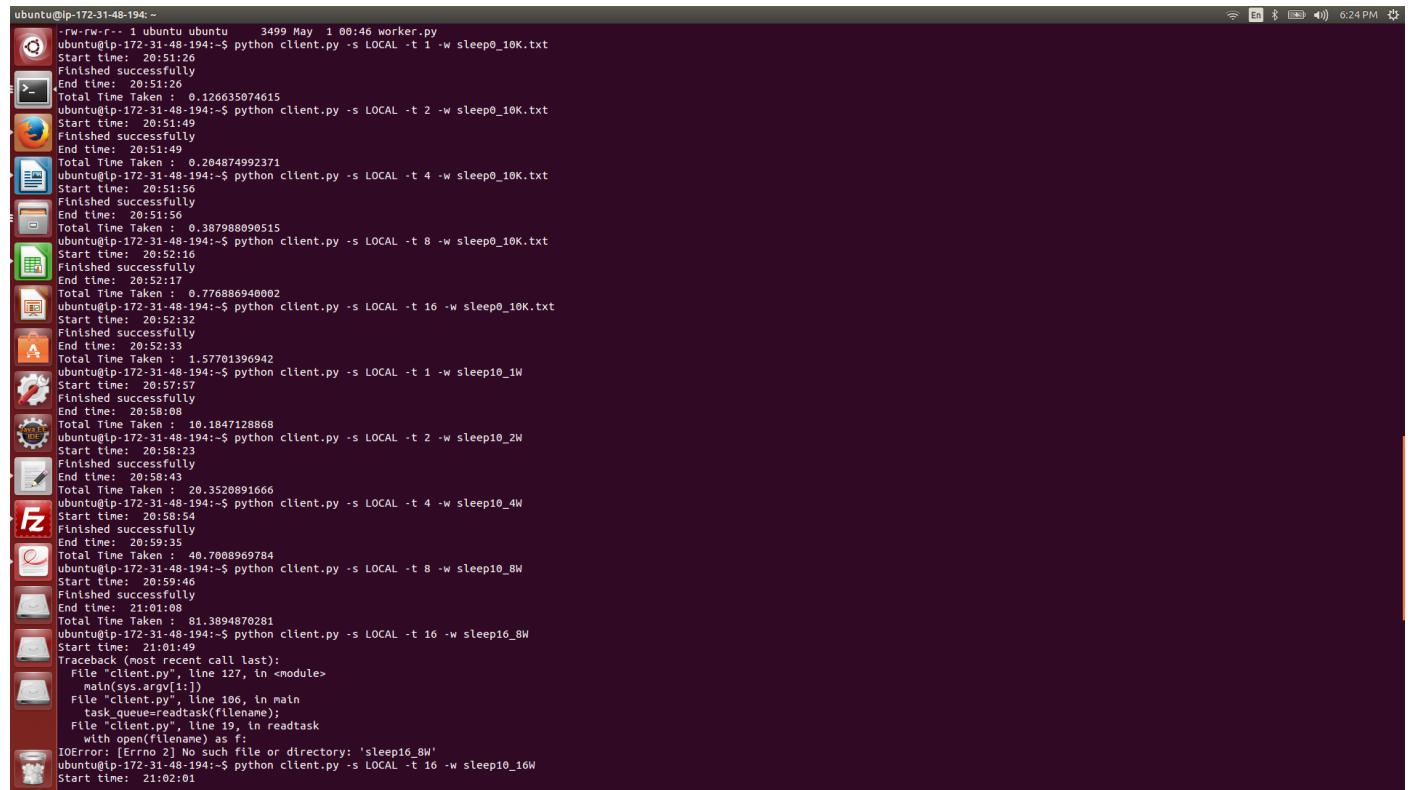
Local Back-End Workers

The below experiments are performed with the local workers i.e the local worker picks up the tasks from in-memory system and executes it.

The experiments are performed parallel using multithreading with number of threads varying between 1,2, 4,8, 16.

Also with increase in threads (increase in workers), we also increase the number of tasks to ensure that each worker gets same amount of the task work load.

Below are the screenshots of the experiments performed.



```
ubuntu@ip-172-31-48-194:~$ ./rw-rw-r 1 ubuntu ubuntu 3499 May 1 00:46 worker.py
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep0_10K.txt
Start time: 20:51:26
Finished successfully
End time: 20:51:26
Total Time Taken : 0.126635074615
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 2 -w sleep0_10K.txt
Start time: 20:51:49
Finished successfully
End time: 20:51:49
Total Time Taken : 0.204874992371
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 4 -w sleep0_10K.txt
Start time: 20:51:56
Finished successfully
End time: 20:51:56
Total Time Taken : 0.387988000515
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 8 -w sleep0_10K.txt
Start time: 20:52:10
Finished successfully
End time: 20:52:17
Total Time Taken : 0.776886940002
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 16 -w sleep0_10K.txt
Start time: 20:52:32
Finished successfully
End time: 20:52:33
Total Time Taken : 1.577801396942
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep10_1W
Start time: 20:52:57
Finished successfully
End time: 20:52:57
Total Time Taken : 10.1847128868
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 2 -w sleep10_2W
Start time: 20:58:23
Finished successfully
End time: 20:58:43
Total Time Taken : 29.3520891666
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 4 -w sleep10_4W
Start time: 20:58:54
Finished successfully
End time: 20:59:35
Total Time Taken : 40.7008969784
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 8 -w sleep10_8W
Start time: 20:59:46
Finished successfully
End time: 21:01:08
Total Time Taken : 81.3894870281
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 16 -w sleep16_8W
Start time: 21:01:49
Traceback (most recent call last):
  File "client.py", line 127, in <module>
    main(sys.argv[1:])
  File "client.py", line 106, in main
    task_queue=readtask(filename);
  File "client.py", line 19, in readtask
    with open(filename) as f:
IOError: [Errno 2] No such file or directory: 'sleep16_8W'
ubuntu@ip-172-31-48-194:~$ python client.py -s LOCAL -t 16 -w sleep10_16W
Start time: 21:02:01
```

```

ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep10_1W
with open(filename) as f:
    f.write("File created")
    f.close()
I/O error: [Errno 2] No such file or directory: 'sleep10_BW'
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep1000_IW
Start time: 21:02:01
Finished successfully
End time: 21:04:44
Total Time Taken : 162.743587817
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep1000_IW
Start time: 21:06:16
Finished successfully
End time: 21:07:53
Total Time Taken : 100.120885979
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 2 -w sleep1000_2W
Start time: 21:08:07
Finished successfully
End time: 21:11:27
Total Time Taken : 200.24110087
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 4 -w sleep1000_4W
Start time: 21:28:22
Finished successfully
End time: 21:27:06
Total Time Taken : 400.484173059
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 8 -w sleep1000_BW
Start time: 22:15:55
Finished successfully
End time: 22:43:16
Total Time Taken : 800.971688032
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 16 -w sleep1000_16W
Start time: 22:51:19
Finished successfully
End time: 22:55:19
Total Time Taken : 1601.95694613
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 1 -w sleep10000_IW
Start time: 22:55:21
Finished successfully
End time: 22:55:42
Total Time Taken : 100.182260113
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 2 -w sleep10000_2W
Start time: 22:55:51
Finished successfully
End time: 22:57:12
Total Time Taken : 200.204586983
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 4 -w sleep10000_4W
Start time: 22:59:43
Finished successfully
End time: 22:57:23
Total Time Taken : 400.403386116
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 8 -w sleep10000_BW
Start time: 22:59:36
Finished successfully
End time: 22:53:57
Total Time Taken : 800.811395168
ubuntu@lp-172-31-48-194:~$ python client.py -s LOCAL -t 16 -w sleep10000_16W
Start time: 22:54:18
Finished successfully
End time: 22:53:59
Total Time Taken : 1601.629004
ubuntu@lp-172-31-48-194:~$ 

```

#Threads	#Tasks (Sleep 0) executed	Time taken (secs)	Throughput (tasks / secs)
1	10000	0.126	79365.07937
2	10000	0.2048	48828.125
4	10000	0.3879	25779.84016
8	10000	0.7768	12873.32647
16	10000	1.577	6341.15409

Task	#Threads	#Tasks performed	Ideal Time (secs) (per worker)	Actual Time (secs) (per worker)	Efficiency (%) (ideal / actual)
Sleep 10ms	1	1000	10	10.1847	98.18649543
Sleep 1	1	100	100	100.12	99.88014383
Sleep 10	1	10	100	100.1	99.9000999
Sleep 10ms	2	2000	10	20.352	98.27044025
Sleep 1	2	200	100	200.241	99.87964503
Sleep 10	2	20	100	200.204	99.89810393
Sleep 10ms	4	4000	10	40.7	98.28009828
Sleep 1	4	400	100	400.484	99.87914623
Sleep 10	4	40	100	400.403	99.8993514
Sleep 10ms	8	8000	10	81.38	98.30425166
Sleep 1	8	800	100	800.971	99.87877214
Sleep 10	8	80	100	800.811	99.89872766
Sleep 10ms	16	16000	10	162.74358	98.31417006
Sleep 1	16	1600	100	1601.956	99.87789927
Sleep 10	16	160	100	1601.629	99.89829105

Remote Back-End Workers

The experiments are performed using remote workers with varying workers from 1,2,4,8,16. With Each worker a new instance is started and the worker script is ran on every instance.

For each instance there is only one client and multiple workers executing the tasks parellelly taken pushed into the SQS queue.

Different tasks such sleep 0, sleep 10ms, sleep 1 sec, sleep 10 sec.

The screenshots depict, client worker start, worker listening (waiting for the tasks to be pushed in SQS queue), time taken to execute the tasks.

Also screenshots are mentioned to show the dynamo_db setup(Dynamo_Table with varying reads/writes) and also queues (MY_QUEUE , PROCESS_QUEUE).

Sleep 0 – 1Worker (10K Tasks):

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-2d658a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.com...	54.82.246.15	pa1_keypair
Client	i-c1f59a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pa1_keypair
PA1 Instance	i-5db793e6	t2.micro	us-east-1b	stopped		None			pa1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped		None			pa1_keypair
Worker 4	i-10e9878d	t2.micro	us-east-1d	terminated		None			pa1_keypair
Worker 3	i-3e9879e	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 2	i-eb492776	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 9	i-59b08ec4	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 10	i-58b08ec5	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 11	i-58b08ec6	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 12	i-58b08ec8	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 13	i-44d08ec9	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 14	i-47d08eda	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 15	i-46d08edb	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 16	i-42d08edf	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 5	i-1fcfa182	t2.micro	us-east-1d	terminated		None			pa1_keypair
worker 6	i-1ecfa183	t2.micro	us-east-1d	terminated		None			pa1_keypair

```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0_10K.txt
Start time: 01:16:22
Terminal already exists.

ubuntu@ip-172-31-53-1:~$ python worker.py -s MY_QUEUE -t 4
listening to queue
```

The above screenshot shows the client pushing the tasks into the SQS Queue and Worker listening i.e. waiting for the tasks to pick up from SQS Queue and execute it once they are available.

SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

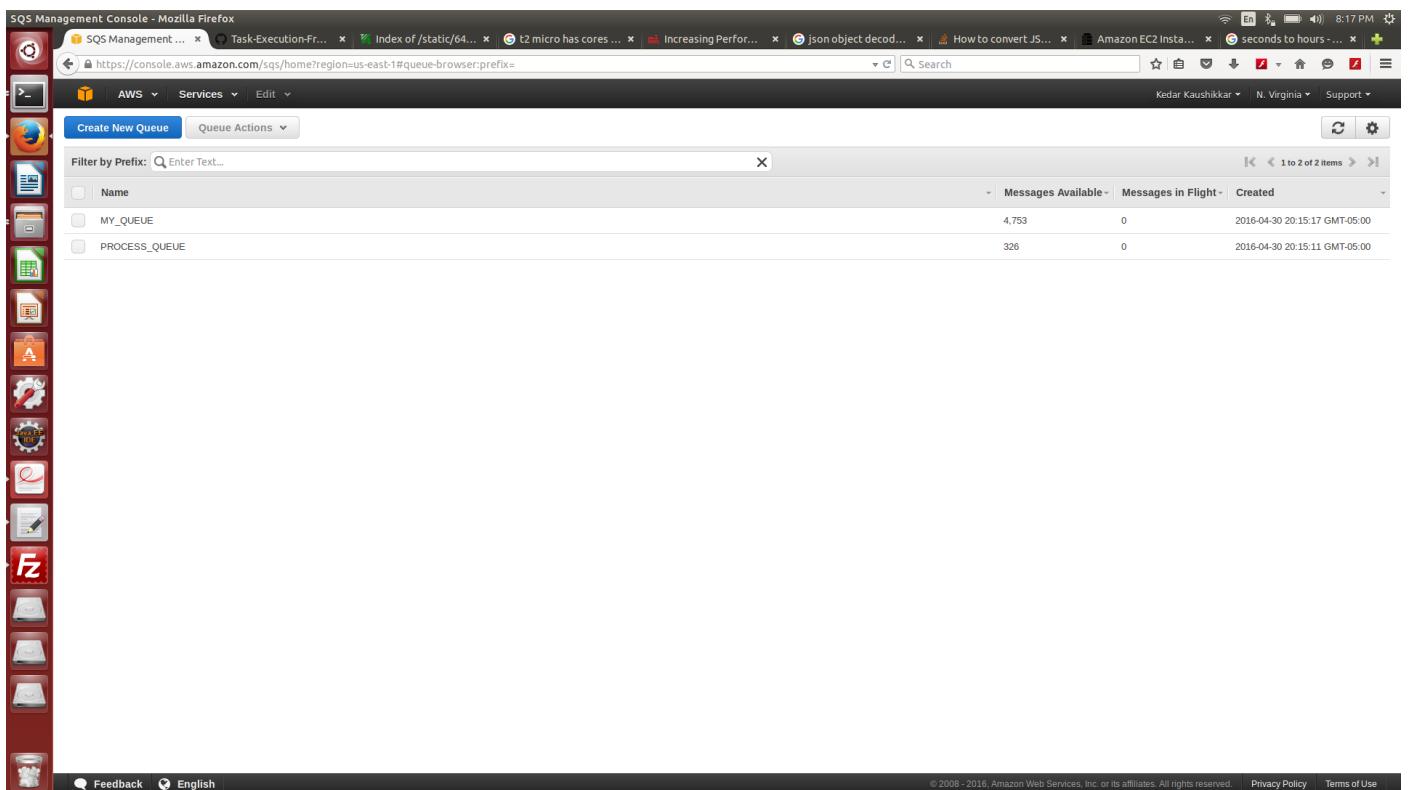
Create New Queue Queue Actions

Filter by Prefix: Enter Text... X

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	4,753	0	2016-04-30 20:15:17 GMT-05:00
PROCESS_QUEUE	326	0	2016-04-30 20:15:11 GMT-05:00

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8:17 PM



SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

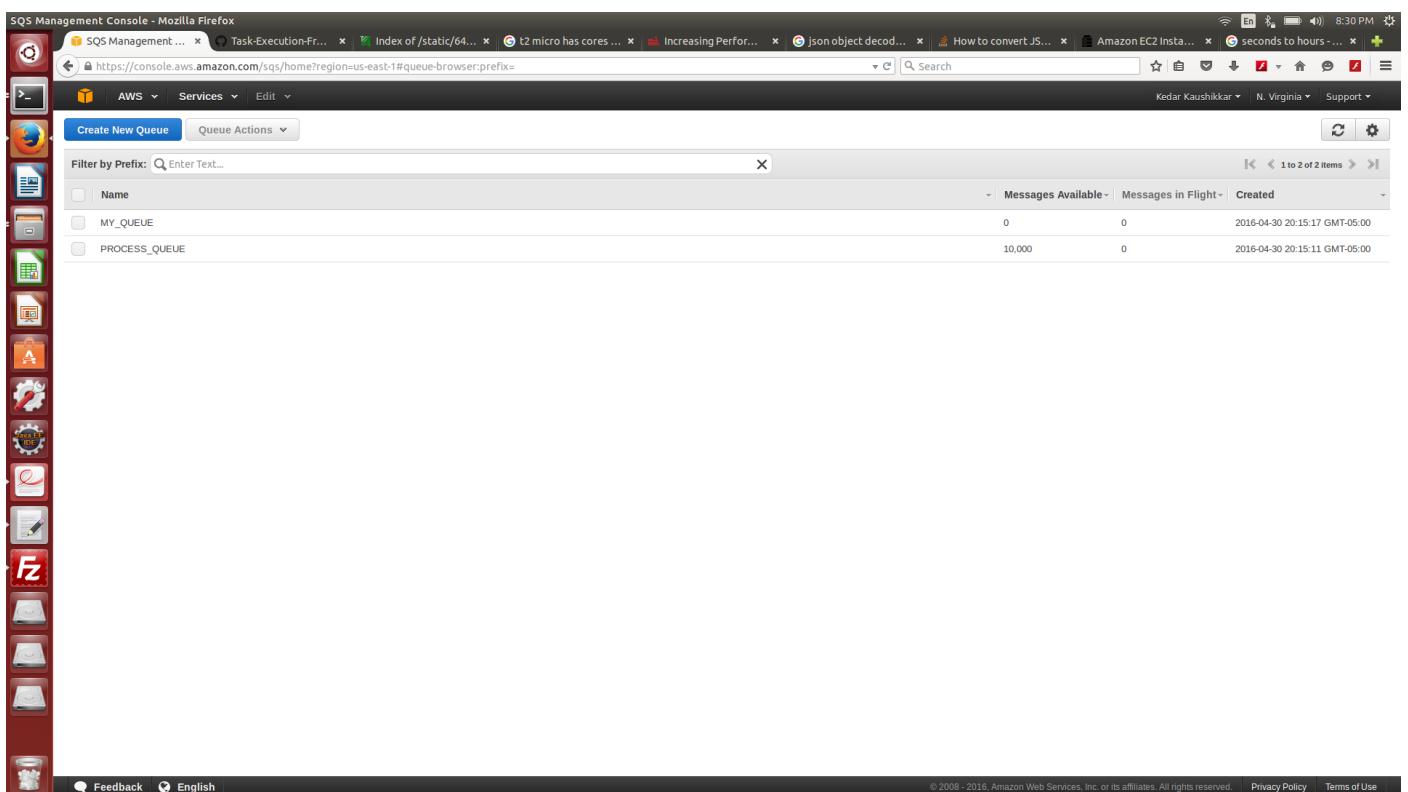
Create New Queue Queue Actions

Filter by Prefix: Enter Text... X

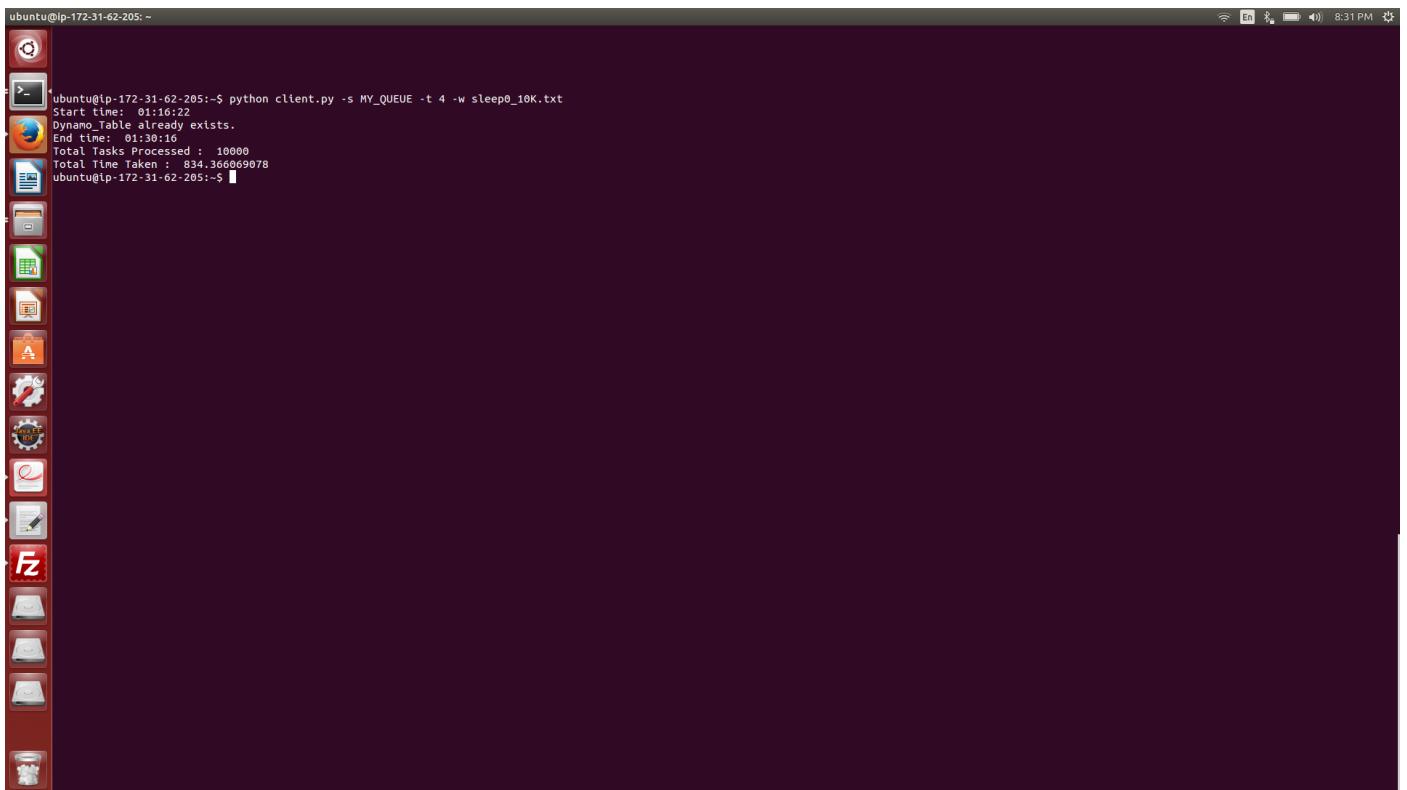
Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 20:15:17 GMT-05:00
PROCESS_QUEUE	10,000	0	2016-04-30 20:15:11 GMT-05:00

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8:30 PM



The above screenshot shows the queue with 10000 tasks processed and completed.

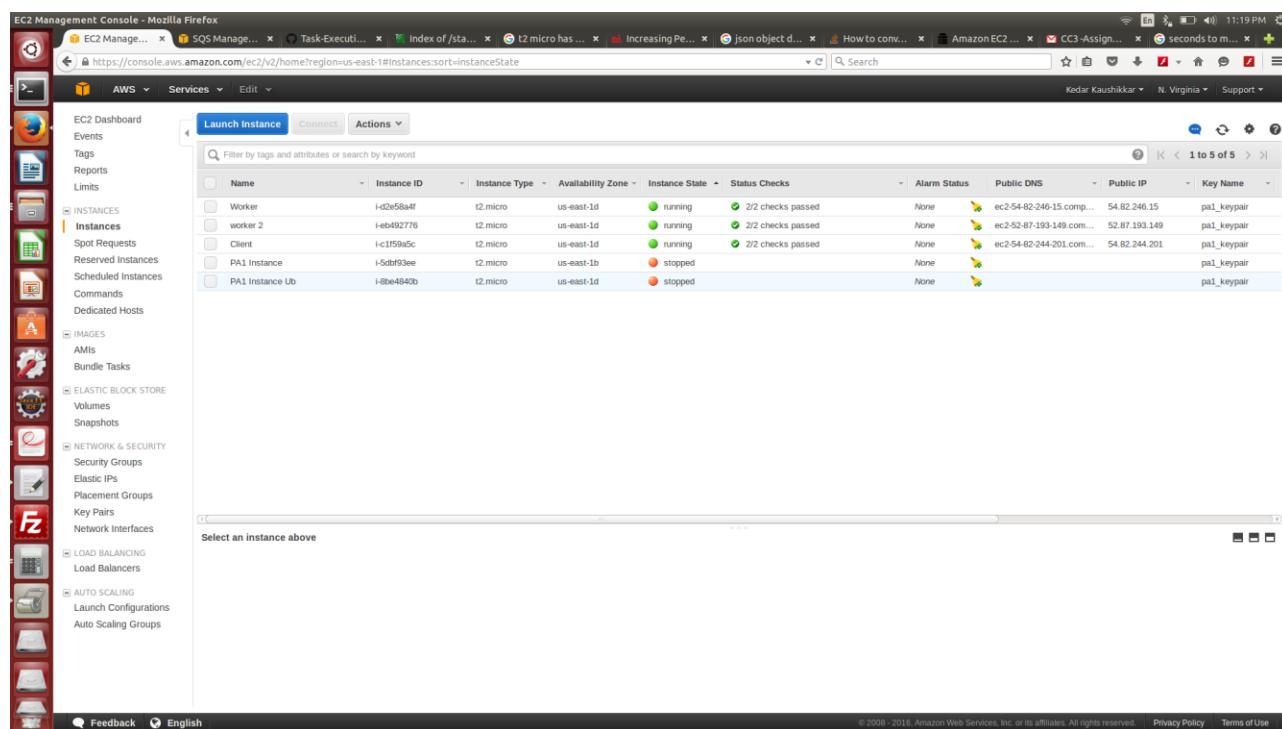


```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0_10K.txt
Start time: 01:16:22
Dynamo Table already exists.
End time: 01:30:16
Total Tasks Processed : 10000
Total Time Taken : 834.366699078
ubuntu@ip-172-31-62-205:~$
```

Above screenshot shows up the output of the task execution by showing the total time taken to execute the tasks.

Sleep 0 – 2Worker (10K Tasks):

Below screenshot shows the 2 workers and 1 client running at a time.



The screenshot shows the Amazon EC2 Management Console interface. The left sidebar navigation bar includes links for AWS Services like EC2 Dashboard, Events, Reports, Limits, Instances, Spot Requests, Reserved Instances, Scheduled Instances, Commands, Dedicated Hosts, AMIs, Bundle Tasks, Elastic Block Store, Volumes, Snapshots, Network & Security, Security Groups, Elastic IPs, Placement Groups, Key Pairs, Network Interfaces, Load Balancing, Load Balancers, Auto Scaling, Launch Configurations, and Auto Scaling Groups. The main content area displays a table of running instances:

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-d2e58a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.com...	54.82.246.15	pat1_keypair
worker 2	i-e492776	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-193-149.com...	52.87.193.149	pat1_keypair
Client	i-1159a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pat1_keypair
PA1 Instance	i-5dbf93ee	t2.micro	us-east-1b	stopped	2/2 checks passed	None	ec2-54-82-246-15.com...	54.82.246.15	pat1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pat1_keypair

This screenshot shows a Linux desktop environment with several open windows. In the top-left window, a terminal session is running a Python worker script, outputting "listening to queue" four times. In the top-right window, another terminal session is running the same script, also outputting "listening to queue" four times. A central window displays a file browser interface. Below these, a large terminal window shows the results of an "ll" command, listing various files and directories. At the bottom of this window, the command "python client.py -s MY_QUEUE -t 4 -w sleep0.txt" is run, along with its execution details.

```
ubuntu@ip-172-31-60-172:~$ python worker.py -s MY_QUEUE -t 4
listening to queue
ubuntu@ip-172-31-53-1:~$ python worker.py -s MY_QUEUE -t 4
listening to queue
ubuntu@ip-172-31-62-205:~$ ll
total 1636
drwxr-Xr-x 4 ubuntu ubuntu 4096 May  1 02:07 .
drwxr-Xr-x 3 root  root  4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr----- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu  240 May  1 02:07 sleep10000_2W
-rw-rw-r-- 1 ubuntu ubuntu 2200 May  1 02:07 sleep1000_2W
-rw-rw-r-- 1 ubuntu ubuntu 18801 May  1 02:07 sleep10_2W
drwxr----- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r--r-- 1 ubuntu ubuntu  963 May  1 02:07 .vmlinu
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
Start time: 02:55:10
Dynamo_Table already exists.
```

This screenshot shows a browser-based AWS SQS Management interface and a Linux terminal window. The browser window displays a list of queues, including "MY_QUEUE" and "PROCESS_QUEUE". The Linux terminal window below shows the results of a "ll" command and the execution of a Python client script. The client script processed 10,000 tasks in 368.130795002 seconds, starting at 02:55:10 and ending at 03:01:18.

```
ubuntu@ip-172-31-62-205:~$ ll
total 1636
drwxr-Xr-x 4 ubuntu ubuntu 4096 May  1 02:07 .
drwxr-Xr-x 3 root  root  4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr----- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu  240 May  1 02:07 sleep10000_2W
-rw-rw-r-- 1 ubuntu ubuntu 2200 May  1 02:07 sleep1000_2W
-rw-rw-r-- 1 ubuntu ubuntu 18801 May  1 02:07 sleep10_2W
drwxr----- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r--r-- 1 ubuntu ubuntu  963 May  1 02:07 .vmlinu
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
Start time: 02:55:10
End time: 03:01:18
Total Tasks Processed : 10000
Total Time Taken : 368.130795002
ubuntu@ip-172-31-62-205:~$
```

Sleep 0 – 4Worker (10K Tasks):

The screenshot shows the AWS EC2 Management Console in Mozilla Firefox. The left sidebar contains navigation links for EC2 Dashboard, Events, Reports, Limits, Instances, Spot Requests, Reserved Instances, Scheduled Instances, Commands, Dedicated Hosts, Images, AMIs, Bundle Tasks, Elastic Block Store, Volumes, Snapshots, Network & Security, Security Groups, Elastic IPs, Placement Groups, Key Pairs, Network Interfaces, Load Balancing, Load Balancers, Auto Scaling, Launch Configurations, and Auto Scaling Groups.

The main content area displays a table of instances:

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker 4	i-10e9878d	t2.micro	us-east-1d	running	Initializing	None	ec2-52-207-221-146.compute-1.amazonaws.com	52.207.221.146	pa1_keypair
Worker 3	i-13e9878e	t2.micro	us-east-1d	running	Initializing	None	ec2-52-23-248-207.com...	52.23.248.207	pa1_keypair
Worker	i-d2e65ba4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.comp...	54.82.246.15	pa1_keypair
worker 2	i-bd92776	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-97-193-149.com...	52.87.193.149	pa1_keypair
Client	i-c159a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pa1_keypair
PA1 Instance	i-5bf93ee	t2.micro	us-east-1b	stopped		None			pa1_keypair
PA1 Instance Ub	i-6be4840b	t2.micro	us-east-1d	stopped		None			pa1_keypair

A detailed view of instance i-10e9878d (Worker 4) is shown in a modal window:

Description	Value
Instance ID	i-10e9878d
Instance state	running
Instance type	t2.micro
Private DNS	ip-172-31-62-103.ec2.internal
Private IPs	172.31.62.103
Secondary private IPs	
VPC ID	vpc-f6e3240a
Subnet ID	subnet-6f40a45
Public DNS	ec2-52-207-221-146.compute-1.amazonaws.com
Public IP	52.207.221.146
Elastic IP	-
Availability zone	us-east-1d
Security groups	launch-wizard-54, view rules
Scheduled events	No scheduled events
AMI ID	Workers (ami-adacabc0)
Platform	-

The screenshot shows four terminal windows on an Ubuntu server (Ubuntu 14.04 LTS) with the terminal window title "Terminal".

- Terminal 1:** Shows the command `python worker.py -s MY_QUEUE -t 4` being run. The output shows the worker listening to a queue every 10 seconds.
- Terminal 2:** Shows the command `python worker.py -s MY_QUEUE -t 4` running on another instance. The output shows the worker listening to a queue every 10 seconds.
- Terminal 3:** Shows the command `ll` being run to list the contents of the current directory. The output shows various files including `client.py`, `get-pip.py`, and several log files.
- Terminal 4:** Shows the command `python client.py -s MY_QUEUE -t 4 -w sleep0.txt` being run. The output shows the client starting at 04:24:53 and noting that the DynamoTable already exists.
- Terminal 5:** Shows the command `python worker.py -s MY_QUEUE -t 4` running on another instance. The output shows the worker listening to a queue every 10 seconds.

```
Terminal
ubuntu@ip-172-31-60-172:~$ ls -l
total 1656
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 04:20 .
drwxr-xr-x 3 root   root   4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 240 Apr 30 23:08 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:08 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:08 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu 480 May  1 04:20 sleep1000_4W
-rw-rw-r-- 1 ubuntu ubuntu 4400 May  1 04:20 sleep1000_4W
-rw-rw-r-- 2 ubuntu ubuntu 3080 May  1 04:20 sleep10_4W
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:08 ssh/
-rw-r--r-- 1 ubuntu ubuntu 1689 May  1 04:18 vmlininfo
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
Start time: 04:24:53
Dynamo_Table already exists.
End time: 04:26:37
Total Tasks Processed : 10000
Total Time Taken : 104.134953022
Ubuntu@ip-172-31-62-205:~$
```

SQS Management Console - Mozilla Firefox

Feedback English

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EC2 Manage... SQS Manage... Task-Execut... Index of sta... t2 micro has... Increasing Pe... json object d... How to conv... Amazon EC2 ... CC3-Assig... seconds to m...

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	10,000	0	2016-04-30 23:17:11 GMT-05:00

Sleep 0 – 8Worker (10K Tasks):

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-d2e58a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.comp...	54.82.246.15	pa1_keypair
Worker 4	i-10e9678d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-207-221-146.co...	52.207.221.146	pa1_keypair
Worker 3	i-13e9878e	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-23-248-207.com...	52.23.248.207	pa1_keypair
worker 2	i-eb492776	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-193-149.com...	52.87.193.149	pa1_keypair
worker 5	i-1fcfa182	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-8-2.compute...	52.90.8.2	pa1_keypair
worker 6	i-1fcfa183	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-169-176.comp...	52.91.169.176	pa1_keypair
worker 7	i-11fcfa18c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-116-38.comp...	52.90.116.38	pa1_keypair
worker 8	i-10fcfa18d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-97-232.comp...	52.91.97.232	pa1_keypair
Client	i-c1f595c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pa1_keypair
PA1 Instance	i-5dbf93ee	t2.micro	us-east-1b	stopped		None	ec2-52-91-169-176.comp...	52.91.169.176	pa1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped		None	ec2-52-90-116-38.comp...	52.90.116.38	pa1_keypair

SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	50	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	2,797	0	2016-05-01 00:02:22 GMT-05:00

Feedback English

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Terminal

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	10,000	0	2016-05-01 00:02:22 GMT-05:00

```
ubuntu@ip-172-31-62-205:~ ll
total 1696
drwxr-xr-x 4 ubuntu ubuntu 4896 May  1 05:03 /
drwxr-xr-x 3 root  root 4896 Apr 30 23:08 ..
-rw----- 1 ubuntu ubuntu 96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 229 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr---- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 08:40 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr  9 2014 .profile
-rw-r--r-- 1 ubuntu ubuntu 80099 May  1 02:03 sleep0.txt
-rw-r--r-- 1 ubuntu ubuntu 960 May  1 05:03 sleep10000.BW
-rw-r--r-- 1 ubuntu ubuntu 8800 May  1 05:03 sleep1000.BW
-rw-rw-r-- 1 ubuntu ubuntu 72000 May  1 05:03 sleep10_BW
drwxr---- 2 ubuntu ubuntu 4096 Apr 30 23:08 ssh/
-rw-r----- 1 ubuntu ubuntu 1689 May  1 04:18 vmlinu
ubuntu@ip-172-31-62-205:~ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
Start time: 05:08:44
Dynamo_Table already exists.
End time: 05:10:07
Total Tasks Processed : 10000
Total Time Taken : 83.0885488987
ubuntu@ip-172-31-62-205:~
```

1 SQS Queue selected

Details Permissions Redrive Policies

Name: PROCESS_QUEUE

URL: https://sqs.us-east-1.amazonaws.com/637619184288/PROCESS_QUEUE

ARN: arn:aws:sqs:us-east-1:637619184288:PROCESS_QUEUE

Created: 2016-05-01 00:02:22 GMT-05:00

Last Updated: 2016-05-01 00:02:22 GMT-05:00

Delivery Delay 0 seconds

Message Retention Period 4 days

Maximum Message Size 256 KB

Receive Message Wait Time 0 seconds

Messages Available (Visible): 10,000

Messages in Flight (Not Visible): 0

Messages Delayed: 0

Feedback English

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Sleep 0 – 16 Worker (10K Tasks):

EC2 Management Console - Mozilla Firefox https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#instances:sort=instanceState

Kedar Kaushikkar N. Virginia Support

Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-d2e58a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.comp...	54.82.246.15	pa1_keypair
Worker 4	i-1099678d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-207-221-146.co...	52.207.221.146	pa1_keypair
Worker 3	i-13e9878e	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-23-248-207.com...	52.23.248.207	pa1_keypair
worker 2	i-eb492776	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-193-149.com...	52.87.193.149	pa1_keypair
worker 9	i-59d0bec4	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-24-89.compu...	52.91.24.89	pa1_keypair
worker 10	i-59d0bec5	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-86-91-220.com...	54.86.91.220	pa1_keypair
worker 11	i-59d0bec6	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-23-208-113.com...	52.23.208.113	pa1_keypair
worker 12	i-45d0bed8	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-203-143.com...	52.87.203.143	pa1_keypair
worker 13	i-44d0bed9	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-4-212.compu...	54.88.4.212	pa1_keypair
worker 14	i-47d0beda	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-84-133-39.com...	54.84.133.39	pa1_keypair
worker 15	i-46d0bedb	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-32-188.com...	54.88.32.188	pa1_keypair
worker 16	i-42d0bedf	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-207-253-111.co...	52.207.253.111	pa1_keypair
worker 5	i-1fcfa182	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-8-2.compute...	52.90.8.2	pa1_keypair
worker 6	i-1fcfa183	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-69-176.com...	52.91.69.176	pa1_keypair
worker 7	i-11fcfa18c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-116-38.com...	52.90.116.38	pa1_keypair
worker 8	i-10fcfa18d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-97-232.com...	52.91.97.232	pa1_keypair
Client	i-1f1f598c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pa1_keypair

Instance: i-42d0bedf (worker 16) Public DNS: ec2-52-207-253-111.compute-1.amazonaws.com

Description Status Checks Monitoring Tags

Instance ID: i-42d0bedf
 Instance state: running
 Instance type: t2.micro
 Private DNS: ip-172-31-58-183.ec2.internal
 Private IPs: 172.31.58.183
 Secondary private IPs:
 VPC ID: vpc-fe63249a
 Subnet ID: subnet-6ff40c45

Public DNS: ec2-52-207-253-111.compute-1.amazonaws.com
 Public IP: 52.207.253.111
 Elastic IP: -
 Availability zone: us-east-1d
 Security groups: launch-wizard-56, view rules
 Scheduled events: No scheduled events
 AMI ID: Workers (ami-ad4cab0c)
 Platform: -

Terminal https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#instances:sort=instanceState

Kedar Kaushikkar N. Virginia Support

Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

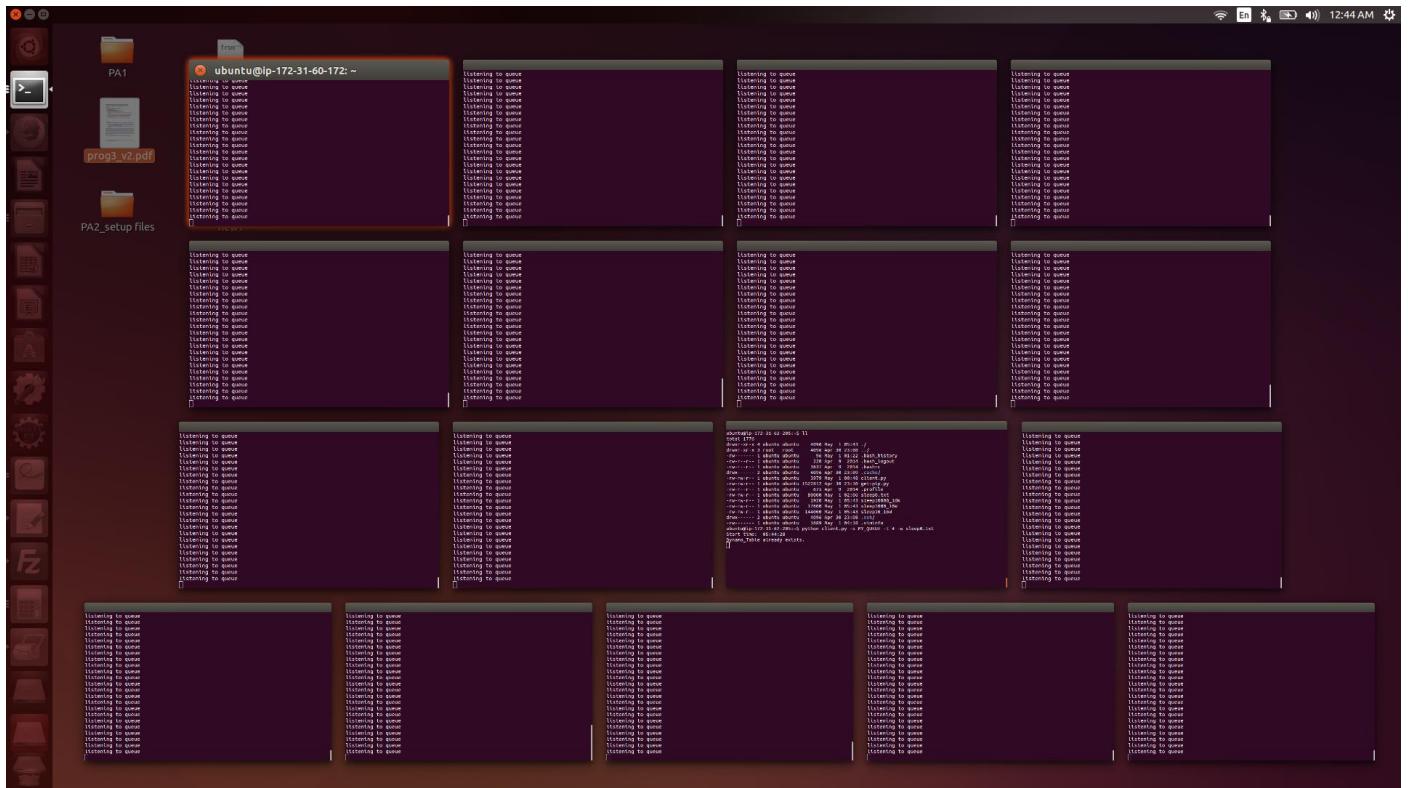
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-d2e58a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-246-15.comp...	54.82.246.15	pa1_keypair
Worker 4	i-1099678d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-207-221-146.co...	52.207.221.146	pa1_keypair
Worker 3	i-13e9878e	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-23-248-207.com...	52.23.248.207	pa1_keypair
worker 2	i-eb492776	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-193-149.com...	52.87.193.149	pa1_keypair
worker 9	i-59d0bec4	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-24-89.compu...	52.91.24.89	pa1_keypair
worker 10	i-59d0bec5	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-86-91-220.com...	54.86.91.220	pa1_keypair
worker 11	i-59d0bec6	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-23-208-113.com...	52.23.208.113	pa1_keypair
worker 12	i-45d0bed8	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-87-203-143.com...	52.87.203.143	pa1_keypair
worker 13	i-44d0bed9	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-4-212.compu...	54.88.4.212	pa1_keypair
worker 14	i-47d0beda	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-84-133-39.com...	54.84.133.39	pa1_keypair
worker 15	i-46d0bedb	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-32-188.com...	54.88.32.188	pa1_keypair
worker 16	i-42d0bedf	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-207-253-111.co...	52.207.253.111	pa1_keypair
worker 5	i-1fcfa182	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-8-2.compute...	52.90.8.2	pa1_keypair
worker 6	i-1fcfa183	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-69-176.com...	52.91.69.176	pa1_keypair
worker 7	i-11fcfa18c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-90-116-38.com...	52.90.116.38	pa1_keypair
worker 8	i-10fcfa18d	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-97-232.com...	52.91.97.232	pa1_keypair
Client	i-1f1f598c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-82-244-201.com...	54.82.244.201	pa1_keypair

```
ubuntu@ip-172-31-62-205:~$ ll
total 177
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 05:43 .
drwxr-xr-x 3 root  root  4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu   96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr  9 23:09 .cache/
-rw-r--r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-r--r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-r--r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-r--r-- 1 ubuntu ubuntu 1920 May  1 05:43 sleep10000_16W
-rw-r--r-- 1 ubuntu ubuntu 17600 May  1 05:43 sleep100_16W
drwxr-xr-x 2 ubuntu ubuntu 144000 May  1 05:43 sleep10_16W
-rw-r--r-- 1 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r--r-- 1 ubuntu ubuntu 1689 May  1 04:18 .vmlinu
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
Start time: 05:44:28
dynamo_Table already exists.
```

Description Status Checks Monitoring Tags

Instance ID: i-42d0bedf
 Instance state: running
 Instance type: t2.micro
 Private DNS: ip-172-31-58-183.ec2.internal
 Private IPs: 172.31.58.183
 Secondary private IPs:
 VPC ID: vpc-fe63249a
 Subnet ID: subnet-6ff40c45

Public DNS: ec2-52-207-253-111.compute-1.amazonaws.com
 Public IP: 52.207.253.111
 Elastic IP: -
 Availability zone: us-east-1d
 Security groups: launch-wizard-56, view rules
 Scheduled events: No scheduled events
 AMI ID: Workers (ami-ad4cab0c)
 Platform: -



SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name

MY_QUEUE

PROCESS_QUEUE

Messages Available: 12 | Messages in Flight: 1 | Created: 2016-04-30 22:55 GMT-05:00

3,185 | 0 | 2016-05-01 00:36:12 GMT-05:00

Feedback English | Privacy Policy Terms of Use

The screenshot shows the AWS Management Console with the SQS service selected. In the main pane, a queue named 'MY_QUEUE' is listed with one message available. Below the console is a terminal window running on an Ubuntu 14.04 LTS system (version 17.6). The terminal shows the output of a Python script named 'client.py' which is sending messages to the queue. The log output includes:

```
ubuntu@ip-172-31-62-205:~$ ll
total 1776
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 05:43 .
drwxr-xr-x 3 root  root  4096 Apr 30 23:08 ..
-rw-r----- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 508 Apr  9 2014 .bashrc
drwxrwxr-x 2 ubuntu ubuntu 4096 Apr 30 23:09 .local/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 Get-pip.py
-rw-rw-r-- 1 ubuntu ubuntu   675 Apr  9 2014 profile

ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep0.txt
listening to queue Start time: 05:44:28
listening to queue Dynamo_Table already exists.
listening to queue End time: 05:45:59
listening to queue Total Tasks Processed : 10000
listening to queue Total Time Taken : 90.8170509338
listening to queue ubuntu@ip-172-31-62-205:~$
```

The terminal also shows the log output of another process, 'worker.py', which is listening to the queue:

```
ubuntu@ip-172-31-60-172:~$ python worker.py -s MY_QUEUE -t 4
listening to queue
```

Sleep 10ms – 1Worker

The screenshot shows the AWS Management Console with the DynamoDB service selected. A table named 'MY_TABLE' is being managed. On the left, a terminal window runs a 'worker.py' script which prints 'listening to queue' ten times.

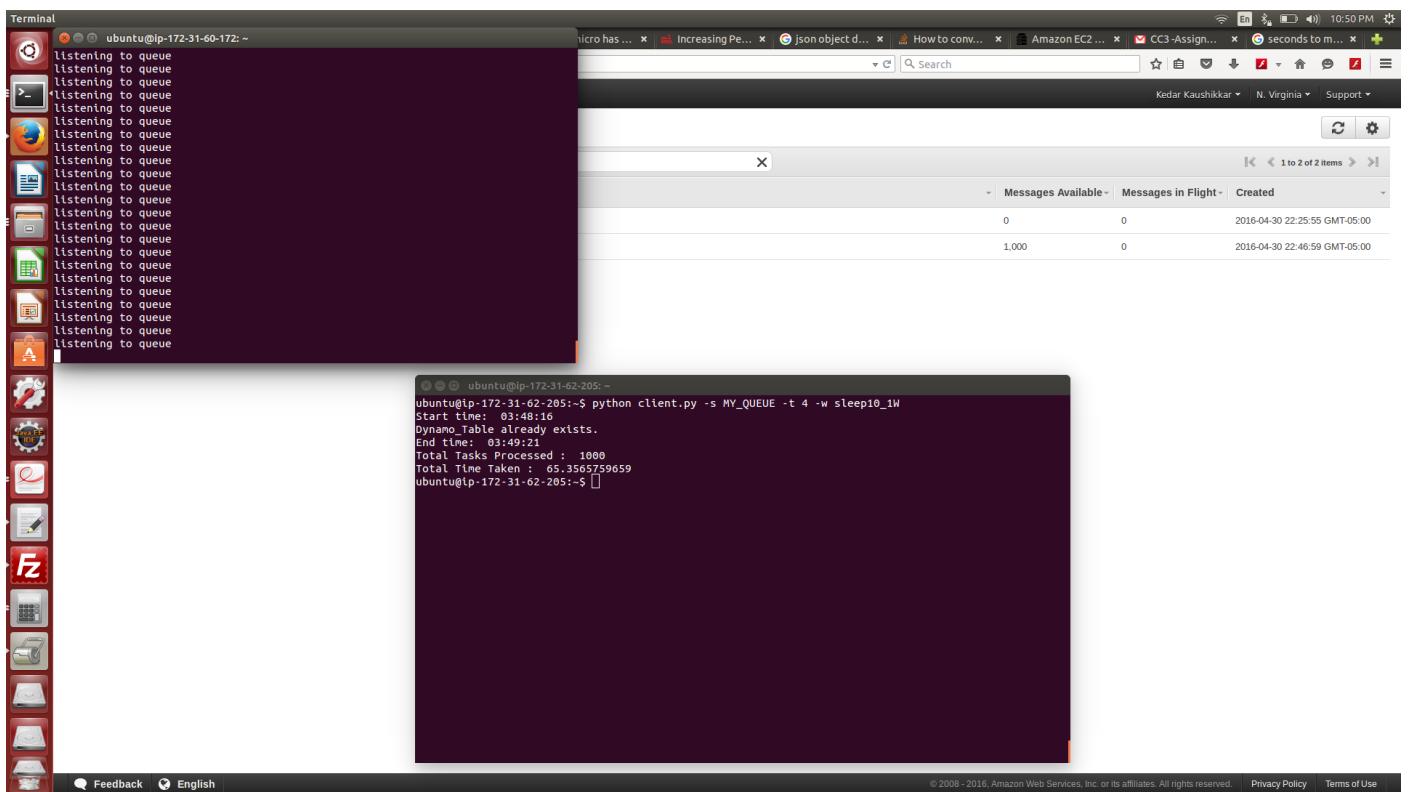
The main pane displays the 'DynamoDB Table Details' for 'MY_TABLE'. The table is described as having 0 items, 0 local secondary indexes, and 0 global secondary indexes. It has a provisioned throughput of 1000 reads and 100 writes. The 'Access control' tab is active. Stream settings are shown as follows:

Stream enabled	No
View type	-
Latest ARN	-

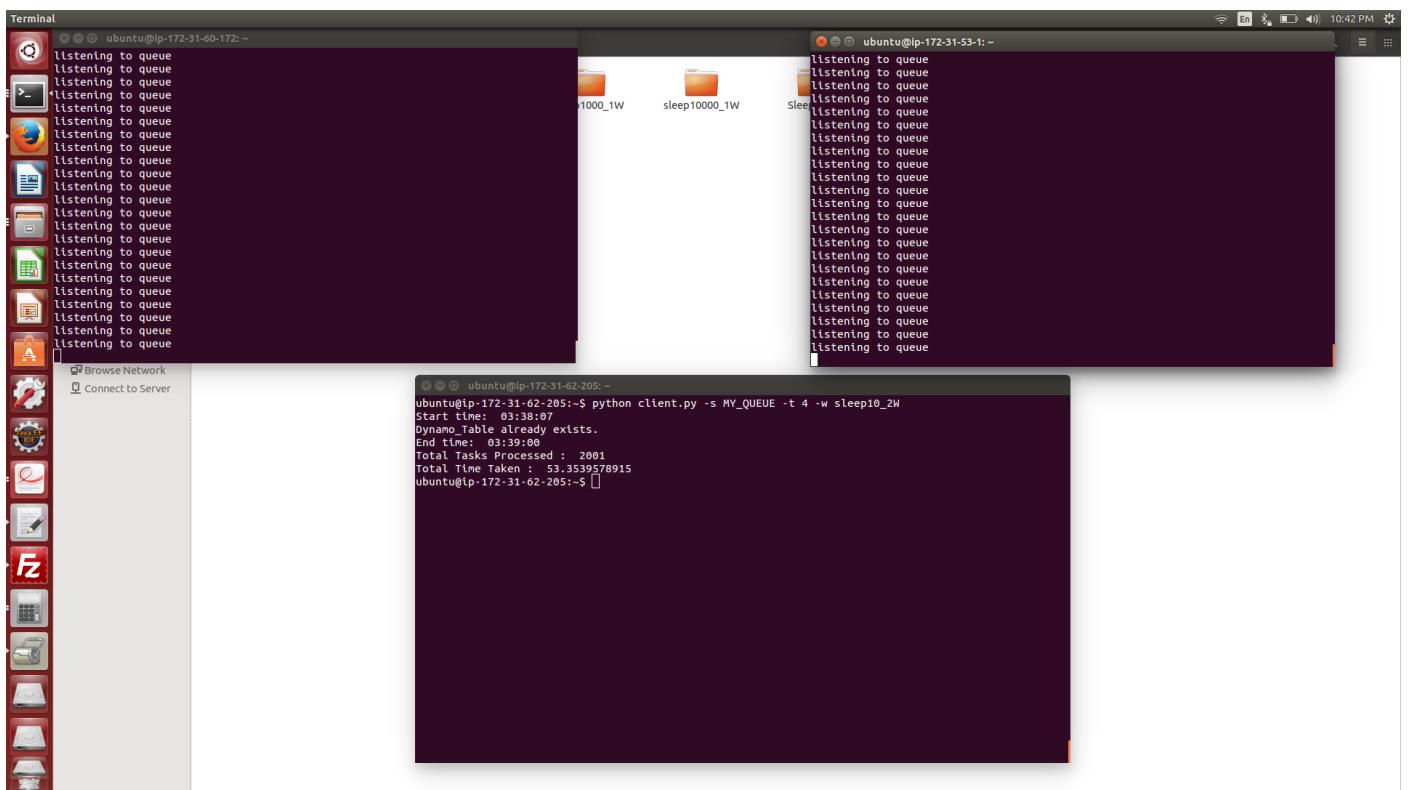
A 'Manage Stream' button is present at the bottom of the stream section. At the bottom of the main pane, a terminal window runs a 'client.py' script which sends a message to the queue and prints the message ID:

```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10_1W
Start time: 03:48:16
Dynamo_Table already exists.

ubuntu@ip-172-31-62-205:~$
```



Sleep 10ms – 2Workers



SQS Management Console - Mozilla Firefox

SQS Manage... x DynamoDB... x Task-Execut... x Index of /sta... x t2 micro has... x Increasing Pe... x json object d... x How to conv... x Amazon EC2 ... x CC3-Assigne... x seconds to m... x

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Kedar Kaushikkar N. Virginia Support

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	2.001	0	2016-04-30 22:37:07 GMT-05:00

Feedback English

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Sleep 10ms – 4Workers

The screenshot shows a Linux desktop environment with several open windows:

- Terminal 1 (Left):** Shows a loop of "listening to queue" messages.
- Terminal 2 (Top Right):** Shows a loop of "listening to queue" messages.
- Terminal 3 (Bottom Left):** Shows a loop of "listening to queue" messages.
- Terminal 4 (Bottom Middle):** Shows a file listing command output:

```
ubuntu@ip-172-31-62-205:~$ ll
total 1656
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 04:20 .
drwxr-xr-x 4 ubuntu ubuntu 4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 228 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwx--x 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 80600 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu   480 May  1 04:28 sleep10000_4W
-rw-rw-r-- 1 ubuntu ubuntu  4400 May  1 04:28 sleep1000_4W
-rw-rw-r-- 1 ubuntu ubuntu 36601 May  1 04:28 sleep10_4W
drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw----- 1 ubuntu ubuntu 1689 May  1 04:18 .vmlinu
```
- File Browser (Center):** Shows a tree view with "Browse Network" and "Connect to Server" options.
- Terminal 5 (Bottom Right):** Shows a loop of "listening to queue" messages.

SQS Management Console - Mozilla Firefox

EC2 Manage... SQS Manage... Task-Executi... Index of /sta... t2 micro has ... IncreasingPe... json object d... How to conv... Amazon EC2 ... CC3-Assign... seconds to m... https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	597	2	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	381	0	2016-04-30 23:34:28 GMT-05:00

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11:36 PM

This screenshot shows the AWS SQS Management Console interface. The top navigation bar includes links for EC2 Management, SQS Management, Task Execution, and various documentation and support pages. The main content area is titled 'Queue Browser' and displays two SQS queues: 'MY_QUEUE' and 'PROCESS_QUEUE'. A search bar at the top allows filtering by queue name. Below the search bar is a table with columns for 'Name', 'Messages Available', 'Messages in Flight', and 'Created'. The 'MY_QUEUE' row shows 597 messages available, 2 in flight, and was created on April 30, 2016, at 22:25:55 GMT-05:00. The 'PROCESS_QUEUE' row shows 381 messages available, 0 in flight, and was created on April 30, 2016, at 23:34:28 GMT-05:00. The bottom of the page includes standard AWS footer links for Feedback, English language selection, and legal notices.

SQS Management Console - Mozilla Firefox

EC2 Manage... SQS Manage... Task-Executi... Index of /sta... t2 micro has ... IncreasingPe... json object d... How to conv... Amazon EC2 ... CC3-Assign... seconds to m... https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

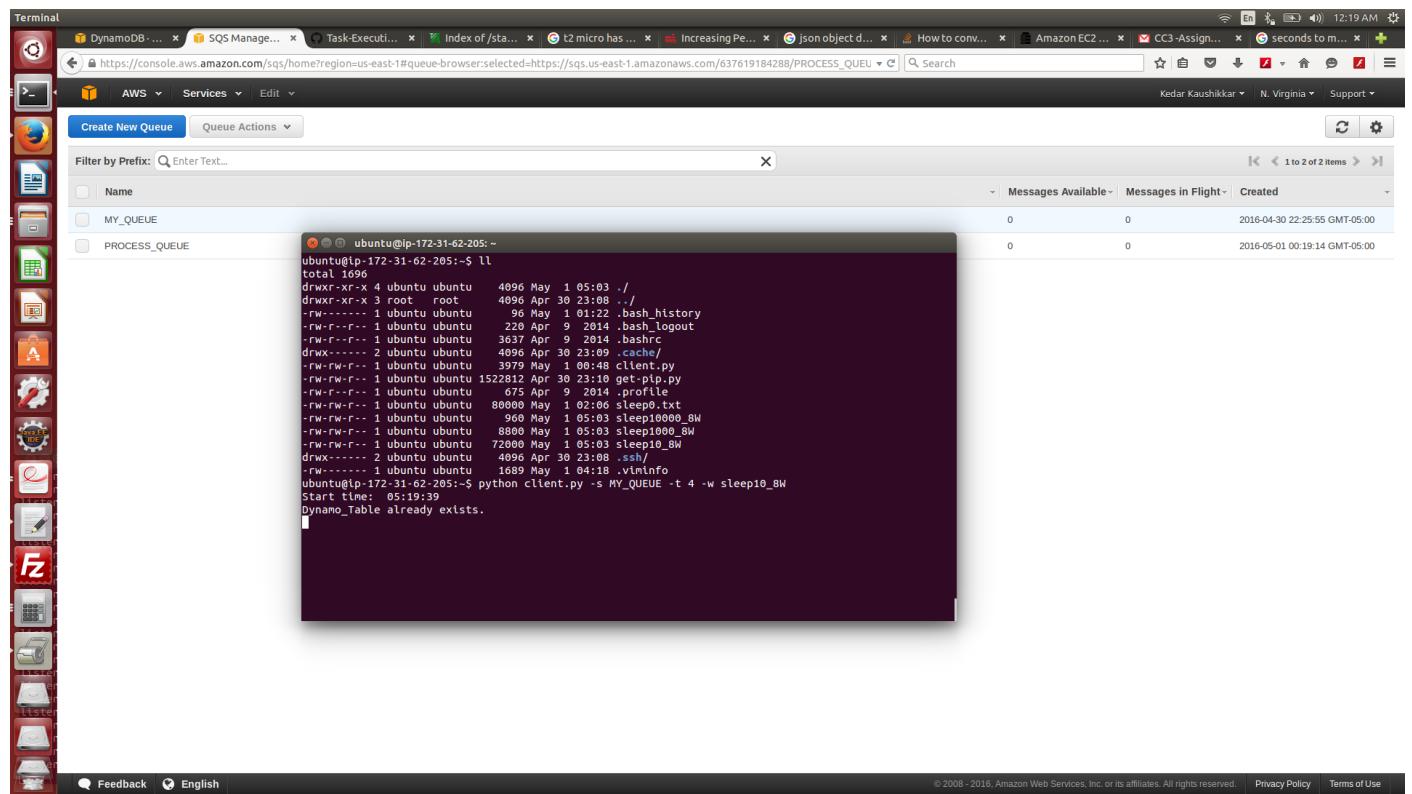
Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	4.000	0	2016-04-30 23:34:28 GMT-05:00

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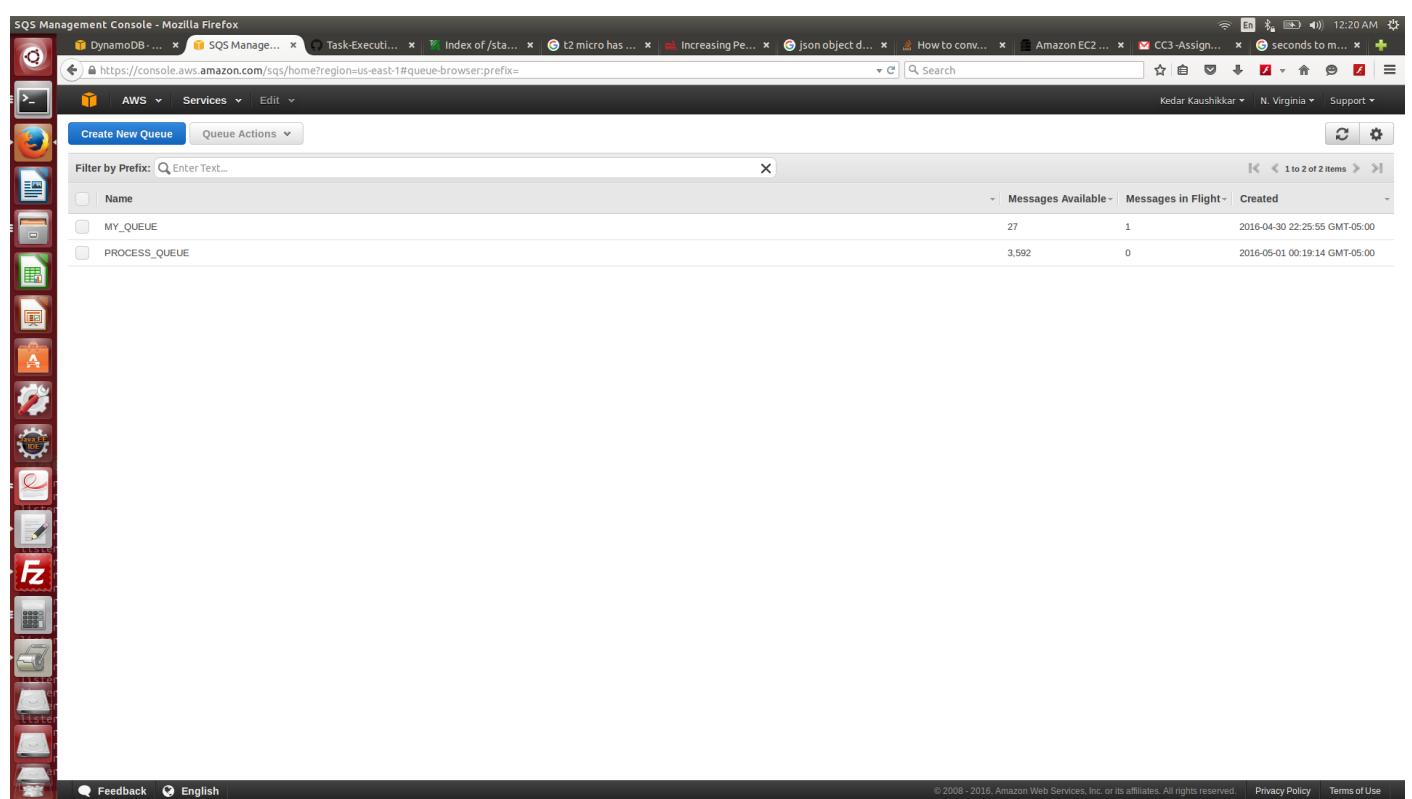
11:41 PM

This screenshot shows the AWS SQS Management Console interface, identical to the one above but with updated data. The 'MY_QUEUE' row now shows 0 messages available and 0 in flight. The 'PROCESS_QUEUE' row now shows 4.000 messages available and 0 in flight. The rest of the interface, including the sidebar with various AWS service icons and the footer links, remains the same.

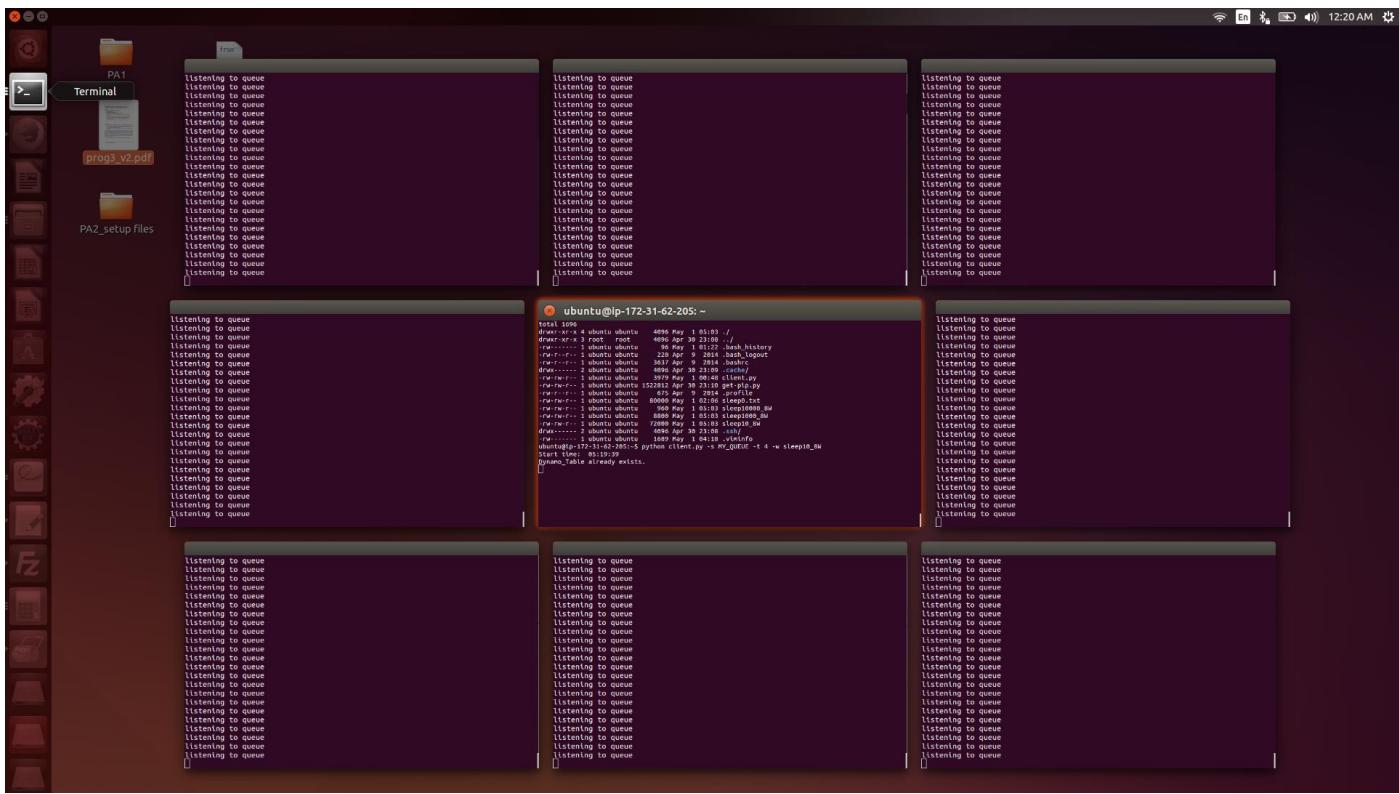
Sleep 10ms – 8Workers



```
ubuntu@ip-172-31-62-205:~ ll
total 1096
drwxr-xr-x  4 ubuntu  ubuntu  4096 May  1 05:03 .
drwxr-xr-x  3 root   root   4096 Apr 30 23:08 ..
-rw-r--r--  1 ubuntu  ubuntu   96 May  1 01:22 .bash_history
-rw-r--r--  1 ubuntu  ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r--  1 ubuntu  ubuntu 3637 Apr  9 2014 .bashrc
drwxr-xr-x  2 ubuntu  ubuntu  4096 Apr 30 23:09 .cache/
-rw-r--r--  1 ubuntu  ubuntu  3979 May  1 00:48 client.py
-rw-r--r--  1 ubuntu  ubuntu 152255 Apr 30 23:09 get-pi.py
-rw-r--r--  1 ubuntu  ubuntu  675 May  1 2014 profile
-rw-rw-r--  1 ubuntu  ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r--  1 ubuntu  ubuntu  960 May  1 05:03 sleep10000_BW
-rw-rw-r--  1 ubuntu  ubuntu  8800 May  1 05:03 sleep1000_BW
-rw-rw-r--  1 ubuntu  ubuntu 72000 May  1 05:03 sleep10_BW
drwxr-xr-x  2 ubuntu  ubuntu  4096 Apr 30 23:09 .ssh/
-rw-r----- 1 ubuntu  ubuntu 1689 May  1 04:18 .viminfo
ubuntu@ip-172-31-62-205:~ python client.py -s MY_QUEUE -t 4 -w sleep10_BW
Start time: 05:19:39
Dynamo_Table already exists.
```



Name	Messages Available	Messages in Flight	Created
MY_QUEUE	27	1	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	3,592	0	2016-05-01 00:19:14 GMT-05:00



Sleep 10ms – 16Workers

Terminal

ubuntu@ip-172-31-62-205: ~

```
total 1776
drwxr-xr-x 4 ubuntu ubuntu 4096 May 1 05:43 .
drwxr-xr-x 3 root root 4096 Apr 30 23:08 ..
-rw-r--r-- 1 ubuntu ubuntu 96 May 1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr 9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 368 Apr 9 2014 .bashrc
drwxr--r-- 2 ubuntu ubuntu 4096 Apr 30 23:08 cache/
-rw-r--r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr 9 2014 profile
-rw-r--r-- 1 ubuntu ubuntu 80000 May 1 02:06 sleep0.txt
-rw-r--r-- 1 ubuntu ubuntu 1920 May 1 05:43 sleep10000_16W
-rw-r--r-- 1 ubuntu ubuntu 17600 May 1 05:43 sleep10000_16W
-rw-r--r-- 1 ubuntu ubuntu 144000 May 1 05:43 sleep10_16W
drwxr--r-- 2 ubuntu ubuntu 4096 Apr 30 23:08 ssh/
-rw-r--r-- 1 ubuntu ubuntu 1689 May 1 04:18 .vmlininfo
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10_16W
Start time: 05:19:39
Dynamo_Table already exists.
```

Resources

You are using the following Amazon EC2 resources in the US East (N. Virginia) region:

- 17 Running Instances
- 0 Dedicated Hosts
- 17 Volumes
- 3 Key Pairs
- 0 Placement Groups
- 0 Elastic IPs
- 9 Snapshots
- 0 Load Balancers
- 59 Security Groups

Create Instance

To start using Amazon EC2 you will want to launch a virtual machine instance.

Launch Instance

Note: Your instances will launch in the US East (N. Virginia) region.

Service Health

Service Status:

- US East (N. Virginia): This service is operating normally

Availability Zone Status:

- us-east-1a: Availability zone is operating normally
- us-east-1b: Availability zone is operating normally
- us-east-1d: Availability zone is operating normally
- us-east-1e: Availability zone is operating normally

Account Attributes

- Supported Platforms: VPC
- Default VPC: vpc-fe63249a
- Resource ID length management

Additional Information

Marketplace

TIBCO Spotfire Analytics Platform (Hourly)

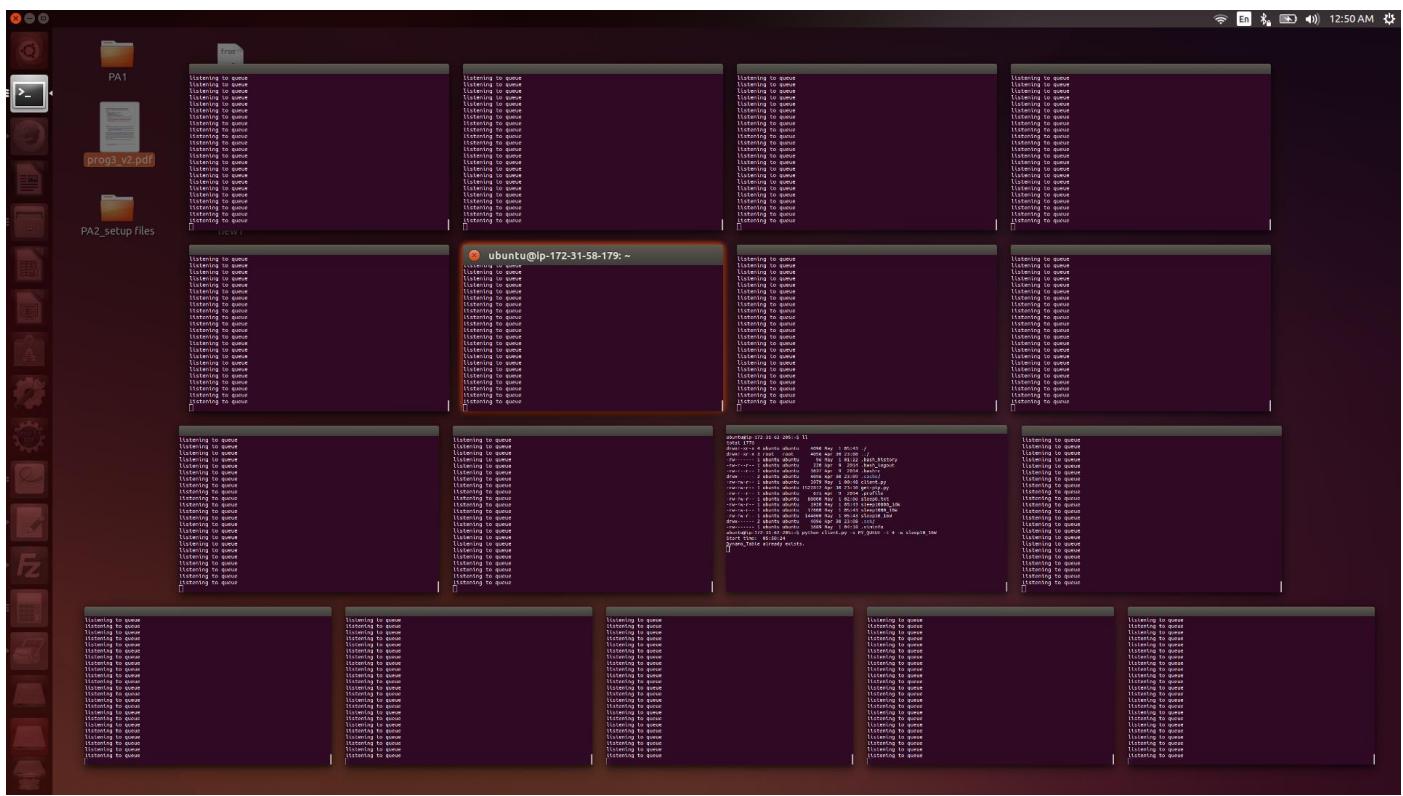
Provided by TIBCO Software, Inc.

Rating ★★★★☆

Pay by the hour for Tibco software and AWS usage

Feedback English

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A screenshot of the AWS SQS Management Console in Mozilla Firefox. The page shows a list of SQS queues. Two queues are visible: "MY_QUEUE" and "PROCESS_QUEUE".

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	7	2	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	2,076	0	2016-05-01 00:48:17 GMT-05:00

The browser tab bar includes links for SQS Management, EC2 Manage..., Task-Execution..., Index of sta..., t2 micro has..., Increasing Pe..., JSON object d..., How to conv..., Amazon EC2..., CC3-Assig..., seconds to m..., and others. The bottom of the page includes standard browser navigation and footer links for Feedback, English, Privacy Policy, and Terms of Use.

Terminal

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:55:55 GMT-05:00
PROCESS_QUEUE	16,000	0	2016-05-01 04:48:17 GMT-05:00

```
ubuntu@ip-172-31-62-205:~$ ll
total 1776
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 05:43 .
drwxr-xr-x 3 root  root 4096 Apr 30 23:08 ..
-rw----- 1 ubuntu ubuntu 96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr  9 2014 profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu 1920 May  1 05:43 sleep10000_16W
-rw-rw-r-- 1 ubuntu ubuntu 17600 May  1 05:43 sleep1000_16W
-rw-rw-r-- 1 ubuntu ubuntu 144000 May  1 05:43 sleep10_16W
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw----- 1 ubuntu ubuntu 1689 May  1 04:18 .vmlininfo
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10_16W
Start time: 05:50:24
Dynamo_Table already exists.
End time: 05:52:33
Total Tasks Processed : 16000
Total Time Taken : 129.371461153
ubuntu@ip-172-31-62-205:~$
```

Feedback English

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Sleep 1sec – 1Worker

Terminal

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:55:55 GMT-05:00
PROCESS_QUEUE	100	0	2016-05-01 04:48:17 GMT-05:00

```
ubuntu@ip-172-31-62-205:~$ ll
total 1652
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 03:59 .
drwxr-xr-x 3 root  root 4096 Apr 30 23:08 ..
-rw----- 1 ubuntu ubuntu 96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr  9 2014 profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu 240 May  1 05:07 sleep1000_2W
-rw-rw-r-- 1 ubuntu ubuntu 2198 May  1 05:07 sleep1000_1W
-rw-rw-r-- 1 ubuntu ubuntu 9000 May  1 03:33 sleep10_1W
-rw-rw-r-- 1 ubuntu ubuntu 18001 May  1 02:07 sleep10_2W
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw----- 1 ubuntu ubuntu 963 May  1 02:07 .vmlininfo
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep1000_1W
Start time: 04:00:58
Dynamo_Table already exists.
End time: 04:02:48
Total Tasks Processed : 100
Total Time Taken : 110.541011095
ubuntu@ip-172-31-62-205:~$
```

Feedback English

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The screenshot shows a desktop environment with several open windows:

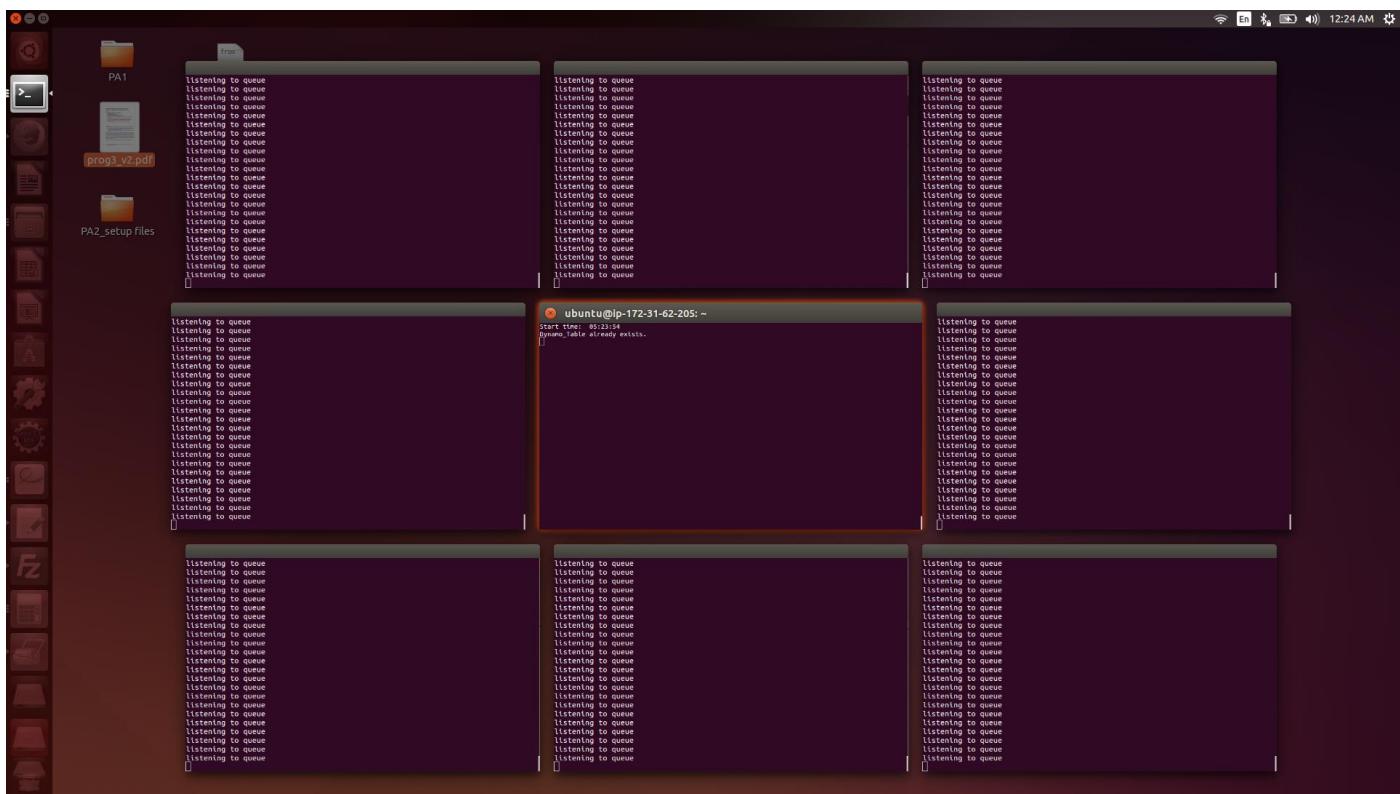
- Terminal 1:** Shows the command "python client.py -s MY_QUEUE -t 4 -w sleep1000_4W" being run, with output indicating it's processing 400 tasks in 109.184 seconds.
- Terminal 2:** Shows a loop of "listening to queue" messages.
- Terminal 3:** Shows a loop of "queue" messages.
- File Manager:** Shows a list of files and folders, many of which have "queue" in their names.

The screenshot shows the AWS SQS Management Console in a browser window. The page displays a list of queues:

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	400	0	2016-04-30 23:44:08 GMT-05:00

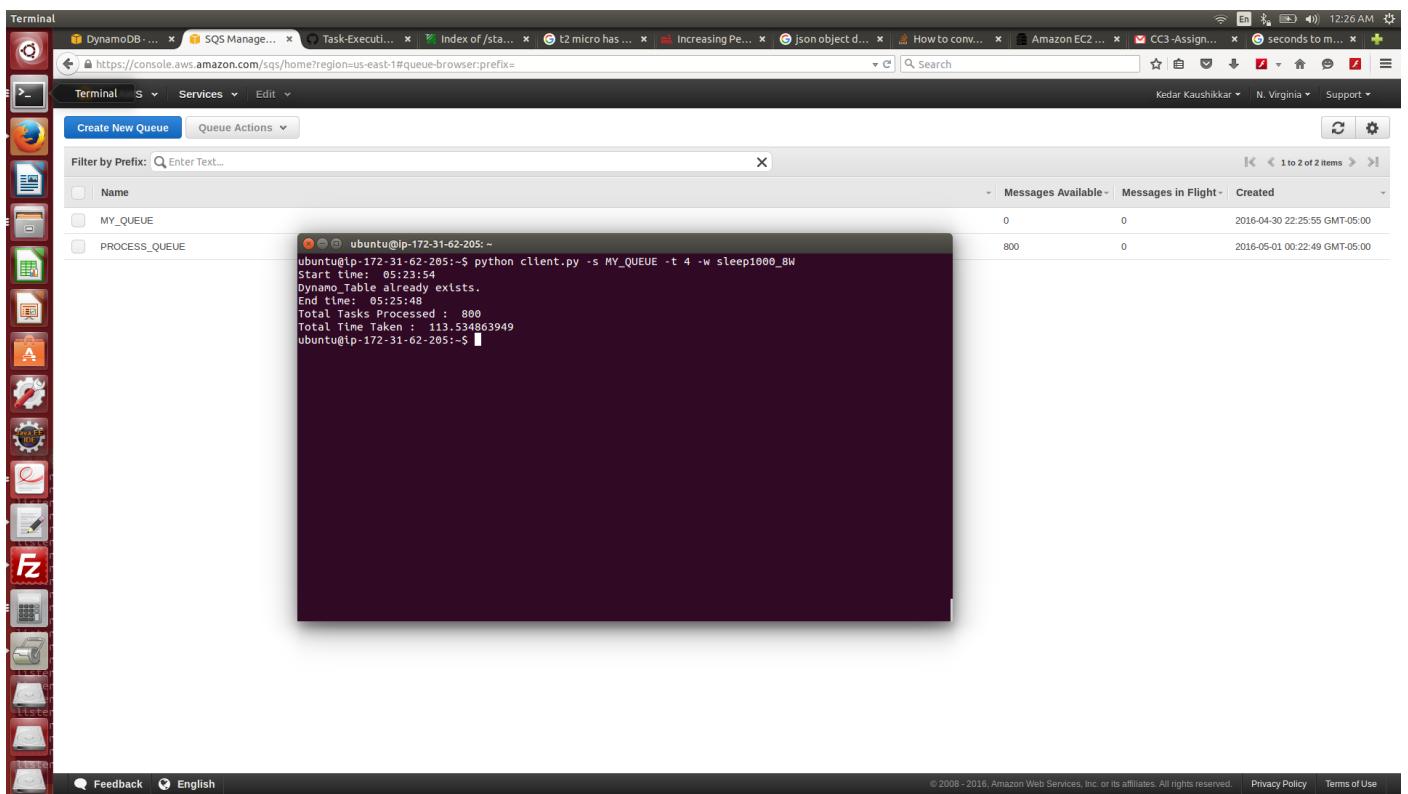
At the bottom of the page, there are links for Feedback, English, Privacy Policy, and Terms of Use.

Sleep 1sec – 8Workers

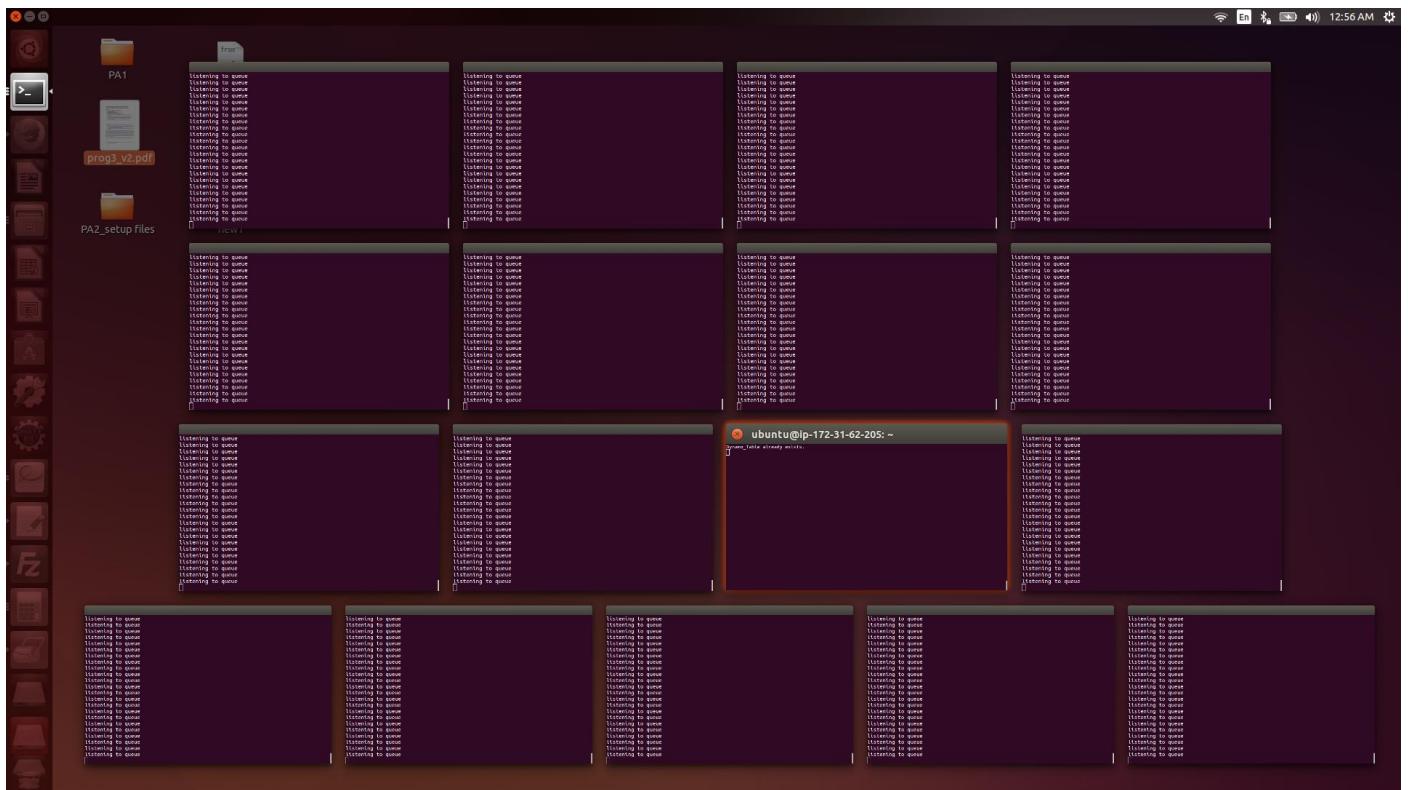


The image shows the AWS SQS Management Console in a Mozilla Firefox browser. The URL is https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=. The interface displays a list of queues under the "Create New Queue" section. Two queues are listed: "MY_QUEUE" and "PROCESS_QUEUE". The "MY_QUEUE" queue has 690 messages available, while the "PROCESS_QUEUE" queue has 104 messages available. The console includes a search bar, navigation buttons, and a header with user information (Kedar Kaushikar, N. Virginia, Support).

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	690	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	104	0	2016-05-01 00:22:49 GMT-05:00



Sleep 1sec – 16Workers



SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	803	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	825	0	2016-05-01 00:54:31 GMT-05:00

Feedback English

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Terminal

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

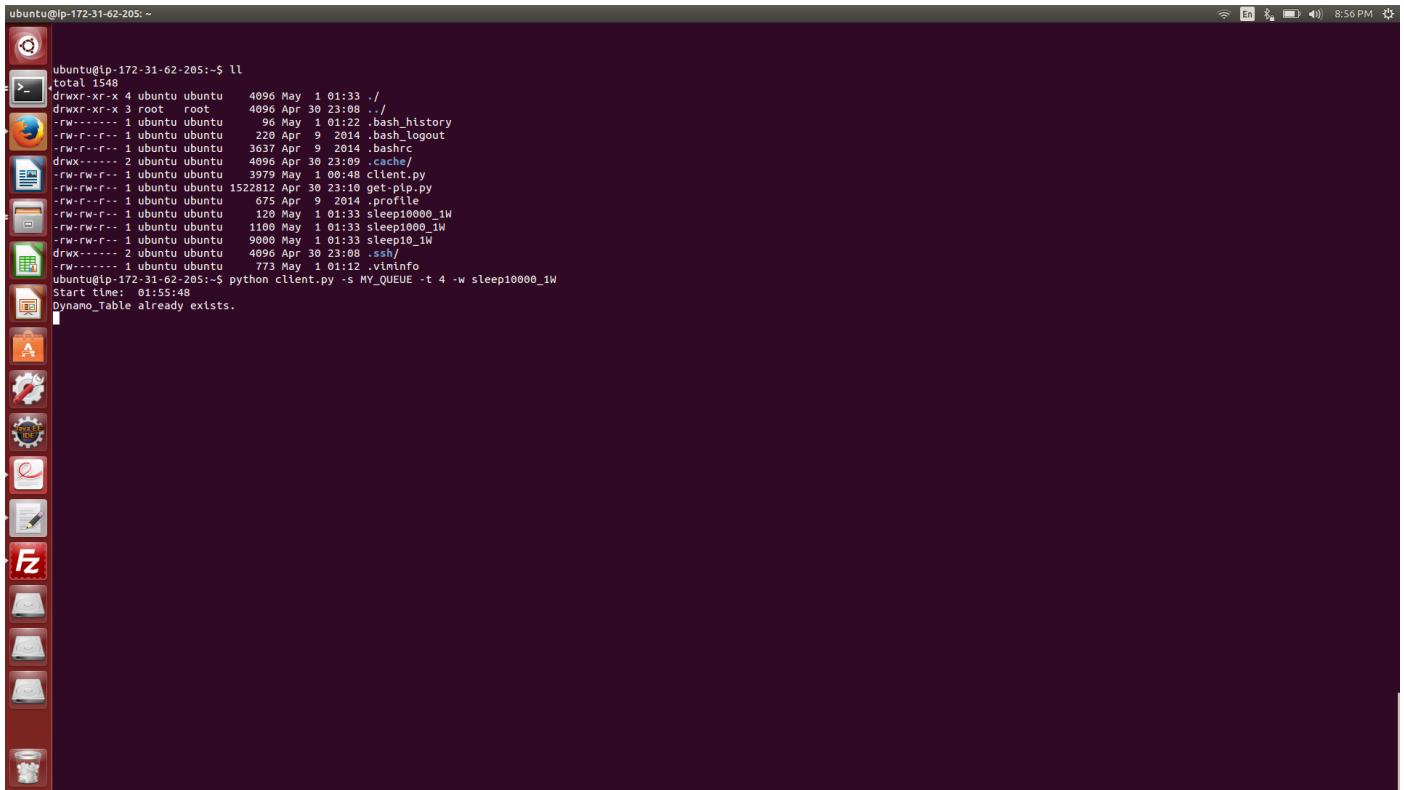
Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	1,600	0	2016-05-01 00:54:31 GMT-05:00

```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep1000_16W
start time : 2016-05-01 00:54:31
dynamo_table already exists.
End time: 05:57:10
Total Tasks Processed : 1600
Total Time Taken : 110.378201962
ubuntu@ip-172-31-62-205:~$
```

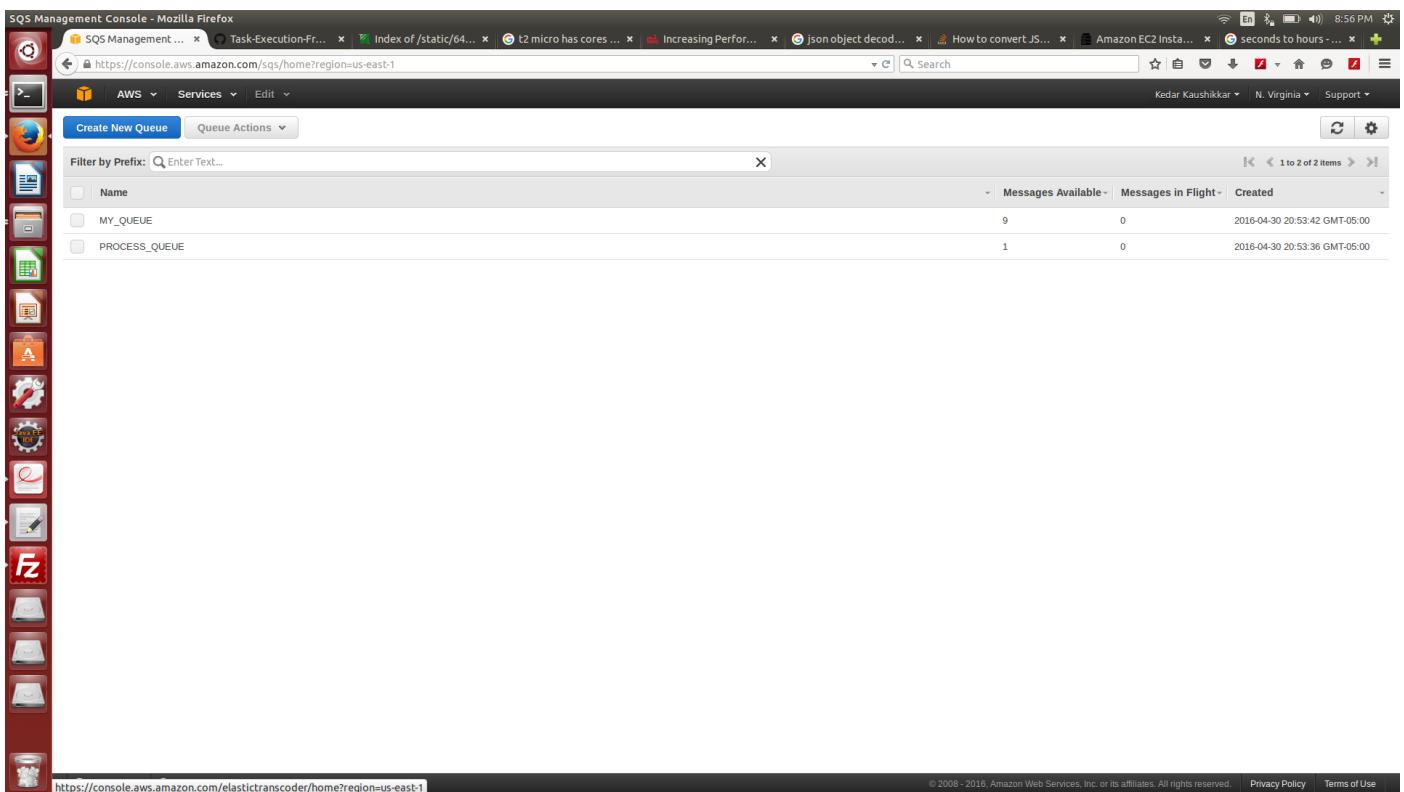
Feedback English

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Sleep 10sec – 1Worker



ubuntu@ip-172-31-62-205:~\$ ll
total 1548
drwxr-xr-x 4 ubuntu ubuntu 4096 May 1 01:33 ./
drwxr-xr-x 3 root root 4096 Apr 30 23:08 ../
-rw-r--r-- 1 ubuntu ubuntu 96 May 1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr 9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 361 Apr 9 2014 .bashrc
drwxr--r-- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May 1 00:48 Client.py
-rw-r--r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr 9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 120 May 1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 1100 May 1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 9000 May 1 01:33 sleep10_1W
drwxr--r-- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
drwxr--r-- 1 ubuntu ubuntu 773 May 1 01:12 .vininfo
ubuntu@ip-172-31-62-205:~\$ python client.py -s MY_QUEUE -t 4 -w sleep10000_1W
Start time: 01:55:48
Dynamo_Table already exists.



SQ Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1

AWS Services Edit

Kedar Kaushikar N. Virginia Support

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	9	0	2016-04-30 20:53:42 GMT-05:00
PROCESS_QUEUE	1	0	2016-04-30 20:53:36 GMT-05:00

https://console.aws.amazon.com/elastictranscoder/home?region=us-east-1

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```

ubuntu@ip-172-31-62-205:~ ll
total 1548
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 01:33 .
drwxr-xr-x 3 root  root  4096 Apr 30 23:08 ../
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 120 May  1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 1100 May  1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 9000 May  1 01:33 sleep10_1W
drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r--r-- 1 ubuntu ubuntu 773 May  1 01:12 .vmlinu
ubuntu@ip-172-31-62-205:~ python client.py -s MY_QUEUE -t 4 -w sleep10000_1W
Start time: 01:55:48
Dynamo Table already exists.
End time: 01:57:34
Total Tasks Processed : 10
Total Time Taken : 185.917491913
ubuntu@ip-172-31-62-205:~
ubuntu@ip-172-31-62-205:~
```

Sleep 10sec – 2Workers

The screenshot shows three terminal windows side-by-side. The leftmost window is titled "Terminal" and shows the output of running "python worker.py -s MY_QUEUE -t 4" on an Ubuntu 14.04 LTS system. It displays the message "listening to queue" repeated four times. The middle window is titled "Micro has ... Increasing Pe..." and shows the output of running "python worker.py -s MY_QUEUE -t 4" on an Amazon Linux instance (us-east-1). It also displays the message "listening to queue" repeated four times. The rightmost window is titled "ubuntu@ip-172-31-62-205:~" and shows the output of running "python client.py -s MY_QUEUE -t 4 -w sleep10000_1W". It shows the start time as 04:09:50 and the end time as 04:10:50, with a total of 10 tasks processed.

```

ubuntu@ip-172-31-60-172:~ python worker.py -s MY_QUEUE -t 4
listening to queue
ubuntu@ip-172-31-62-205:~ ll
total 1636
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 04:07 .
drwxr-xr-x 3 root  root  4096 Apr 30 23:08 ../
-rw-r--r-- 1 ubuntu ubuntu  96 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu  220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3637 Apr  9 2014 .bashrc
drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 client.py
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get-pip.py
-rw-r--r-- 1 ubuntu ubuntu  675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 120 May  1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 1100 May  1 01:33 sleep10000_1W
-rw-rw-r-- 1 ubuntu ubuntu 9000 May  1 01:33 sleep10_1W
drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r--r-- 1 ubuntu ubuntu 773 May  1 01:12 .vmlinu
ubuntu@ip-172-31-62-205:~ python client.py -s MY_QUEUE -t 4 -w sleep10000_1W
Start time: 04:09:50
Dynamo Table already exists.
End time: 04:10:50
Total Tasks Processed : 10
Total Time Taken : 185.917491913
ubuntu@ip-172-31-62-205:~
```

The screenshot shows a Linux desktop environment with several open windows:

- A terminal window titled "Terminal" containing the command "ll" which lists files in the current directory.
- A terminal window titled "ubuntu@ip-172-31-60-172: ~" displaying output from a script that prints "listening to queue" 20 times.
- A terminal window titled "ubuntu@ip-172-31-62-205: ~" displaying the results of an "ll" command and logs from a Python script named "client.py".
- A file browser window showing the contents of the "/tmp" directory.

The desktop has a vertical application menu on the left and a dock with various icons.

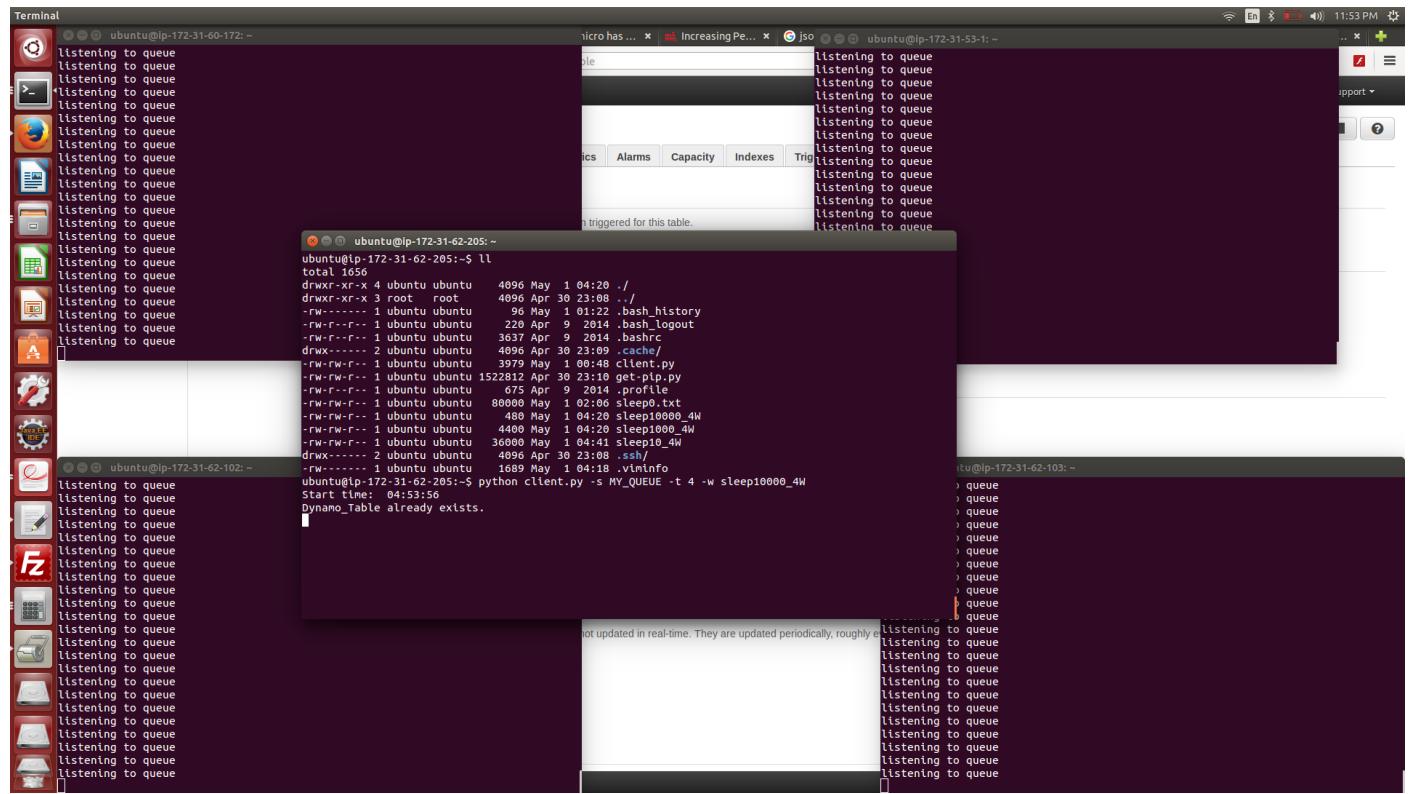
```
total 1636
drwxr-xr-x 4 ubuntu ubuntu 4096 May  1 04:07 /
drwxr-xr-x 3 root  root  4096 Apr 30 23:08 ../
-rw----- 1 ubuntu ubuntu  9 May  1 01:22 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Apr  9 2014 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 363 Apr  9 2014 .bashrc
drwxr-xr-x 2 root  root 4096 Apr 30 23:39 .cache/
-rw-rw-r-- 1 ubuntu ubuntu 3979 May  1 00:48 __pycache__
-rw-rw-r-- 1 ubuntu ubuntu 1522812 Apr 30 23:10 get_pip.py
-rw-r--r-- 1 ubuntu ubuntu 675 Apr  9 2014 .profile
-rw-rw-r-- 1 ubuntu ubuntu 80000 May  1 02:06 sleep0.txt
-rw-rw-r-- 1 ubuntu ubuntu  240 May  1 02:07 sleep1000_2W
-rw-rw-r-- 1 ubuntu ubuntu 2200 May  1 02:07 sleep1000_2W
-rw-rw-r-- 1 ubuntu ubuntu 18001 May  1 02:07 sleep10_2W
drwxr-xr-x 2 ubuntu ubuntu 4096 Apr 30 23:08 .ssh/
-rw-r----- 1 ubuntu ubuntu  963 May  1 02:07 .vmlinu
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10000_2W
Start time: 04:09:50
Dynamo_Table already exists.
End time: 04:11:36
Total Tasks Processed : 28
Total Time Taken : 105.996685982
ubuntu@ip-172-31-62-205:~$
```

The screenshot shows the AWS SQS Management Console in a Mozilla Firefox browser window:

- The URL is <https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=>
- The page displays a list of queues under the prefix "PREFIX":

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	20	0	2016-04-30 23:09:01 GMT-05:00

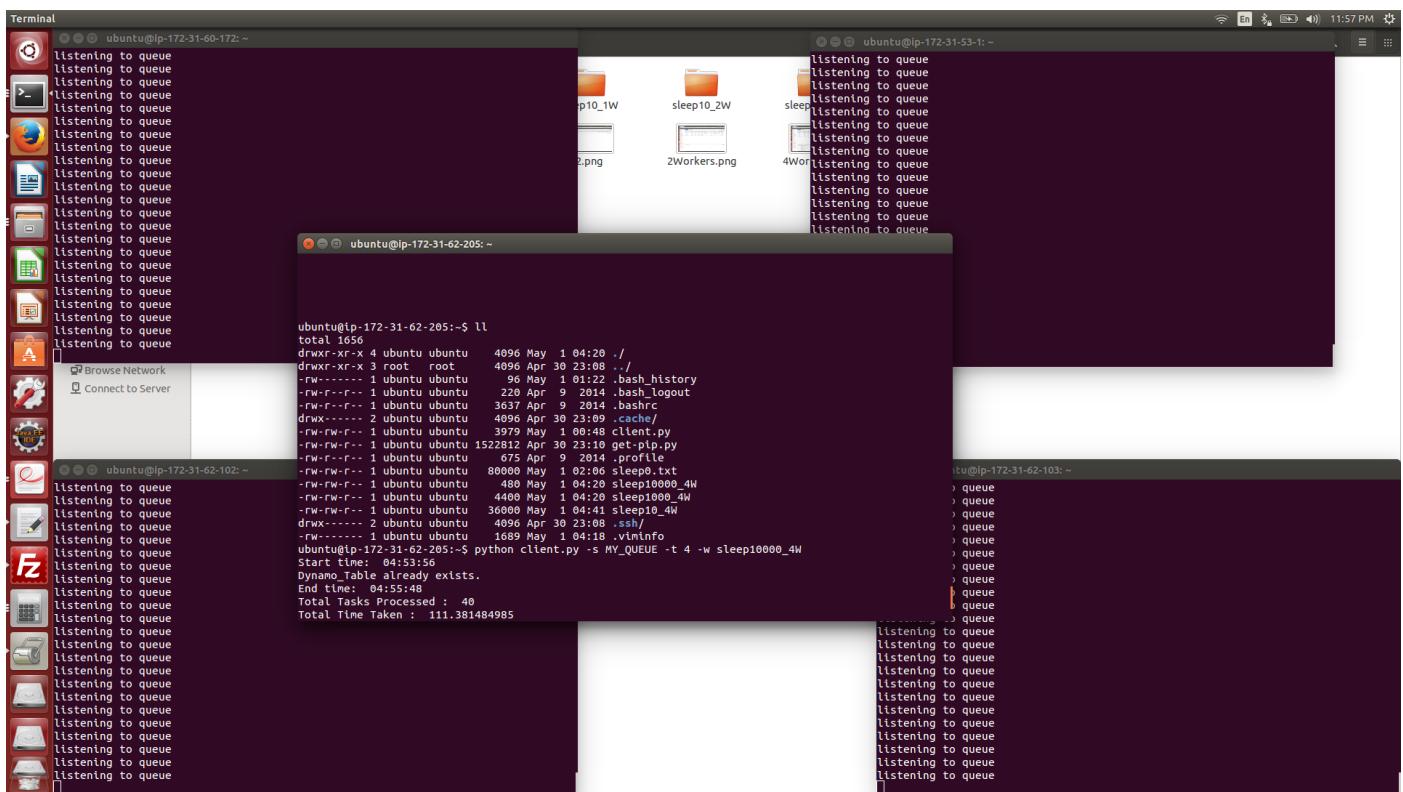
Sleep 10sec – 4Workers



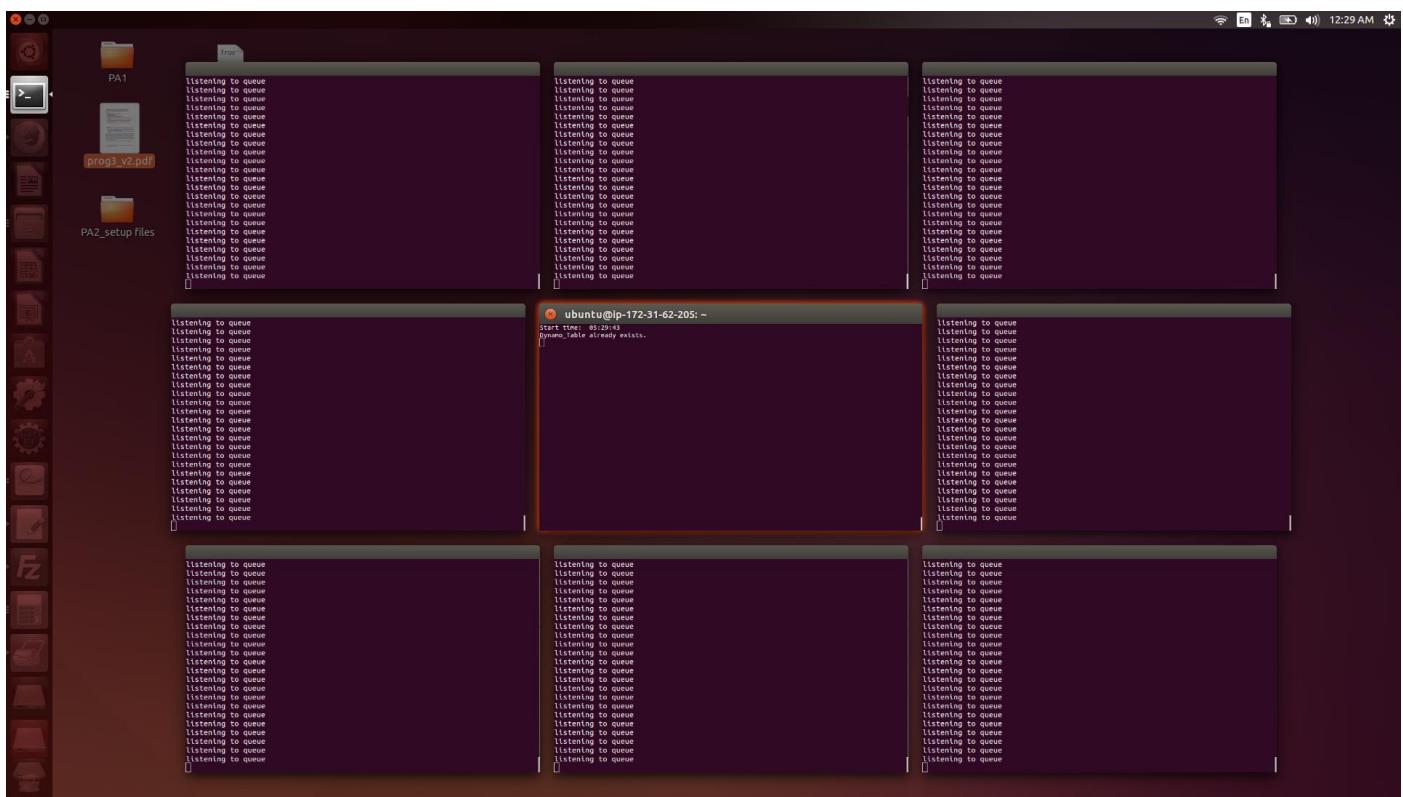
SQS Management Console - Mozilla Firefox

The screenshot shows the AWS SQS Management Console in a Firefox browser window. The interface includes:

- Navigation Bar:** AWS Services, Create New Queue, Queue Actions.
- Filter by Prefix:** Enter Text... (with "MY_QUEUE" selected).
- Queue List:** Two queues are listed:
 - MY_QUEUE:** 36 messages available, 0 messages in flight, created on 2016-04-30 22:25:55 GMT-05:00.
 - PROCESS_QUEUE:** 1 message available, 0 messages in flight, created on 2016-04-30 23:52:59 GMT-05:00.
- Footer:** Feedback, English, © 2008-2016, Amazon Web Services, Inc. or its affiliates. All rights reserved., Privacy Policy, Terms of Use.



Sleep 10sec – 8Workers



SQS Management Console - Mozilla Firefox

DynamoDB... SQS Manage... Task-Executi... Index of /sta... t2 micro has... Increasing Pe... json object d... How to conv... Amazon EC2... CC3-Assign... seconds to m... https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

Search Kedar Kaushikkar N. Virginia Support

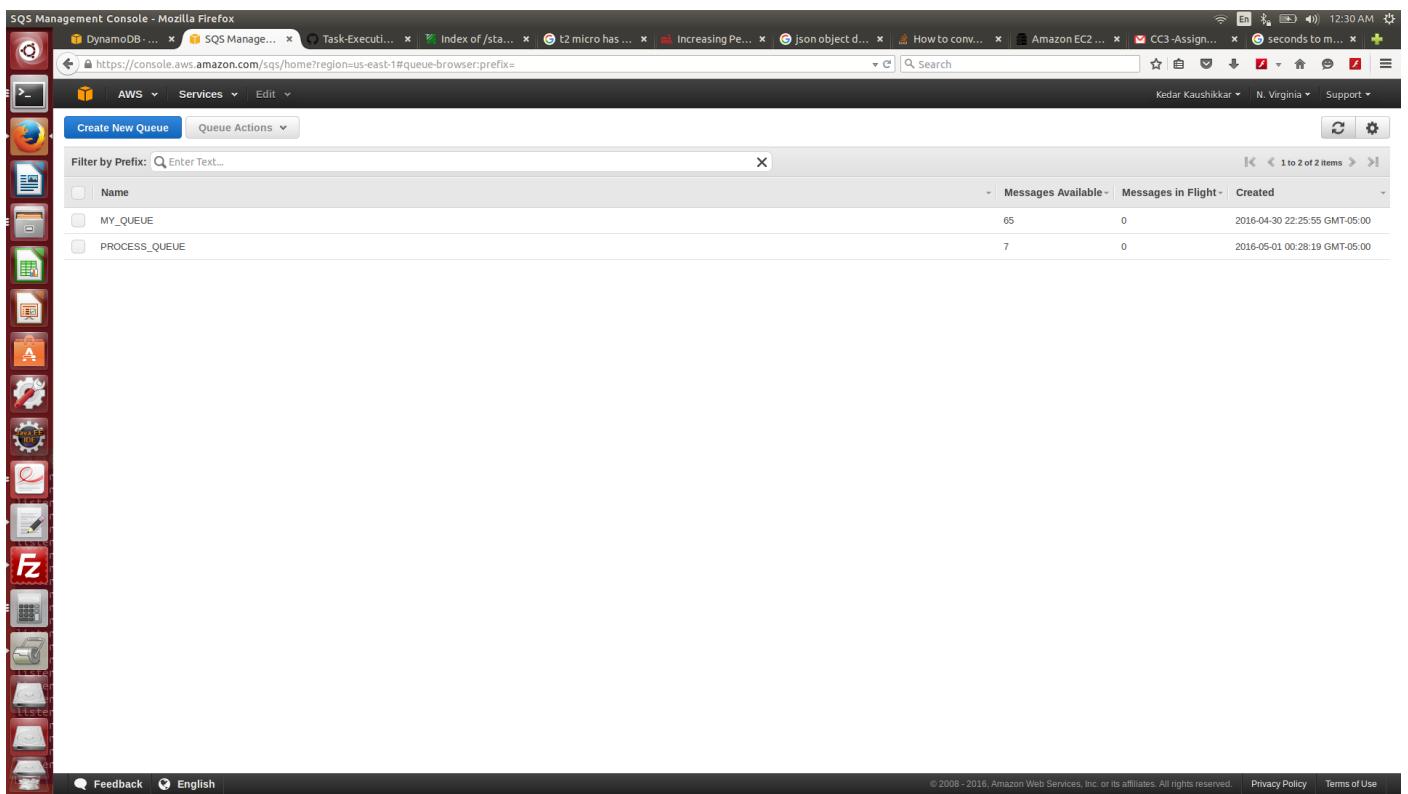
AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	65	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	7	0	2016-05-01 00:28:19 GMT-05:00

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Terminal

DynamoDB... SQS Manage... Task-Executi... Index of /sta... t2 micro has... Increasing Pe... json object d... How to conv... Amazon EC2... CC3-Assign... seconds to m... https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

Kedar Kaushikkar N. Virginia Support

AWS Services Edit

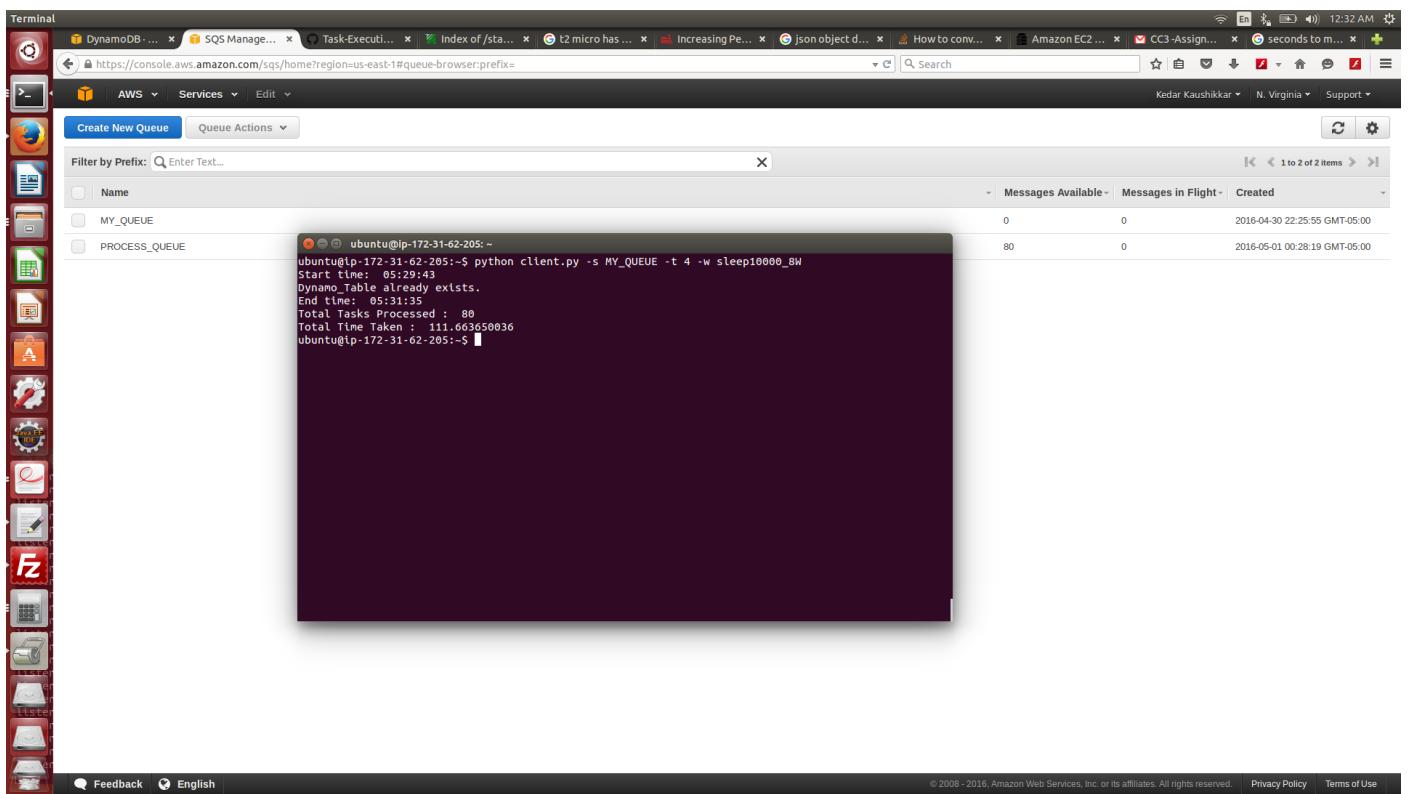
Create New Queue Queue Actions

Filter by Prefix: Enter Text...

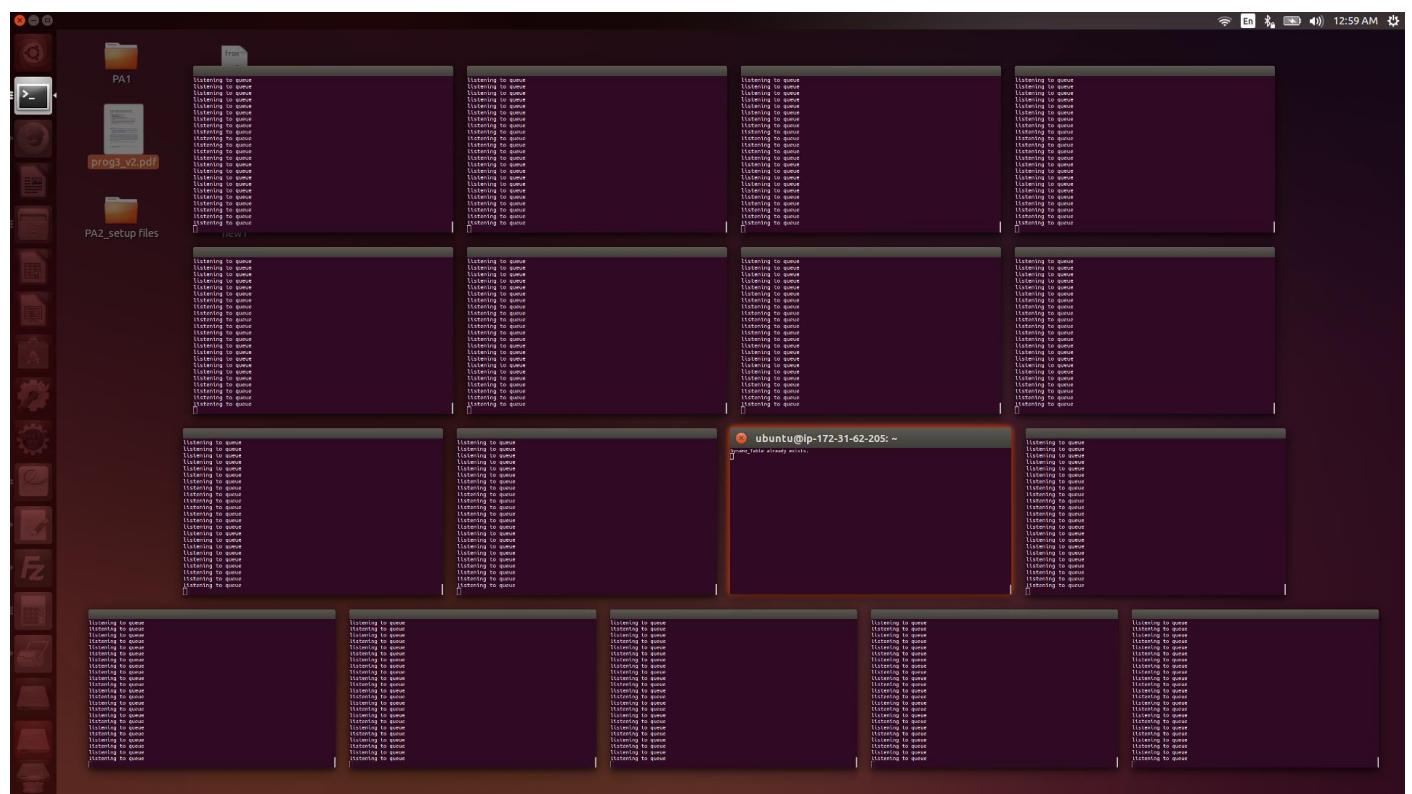
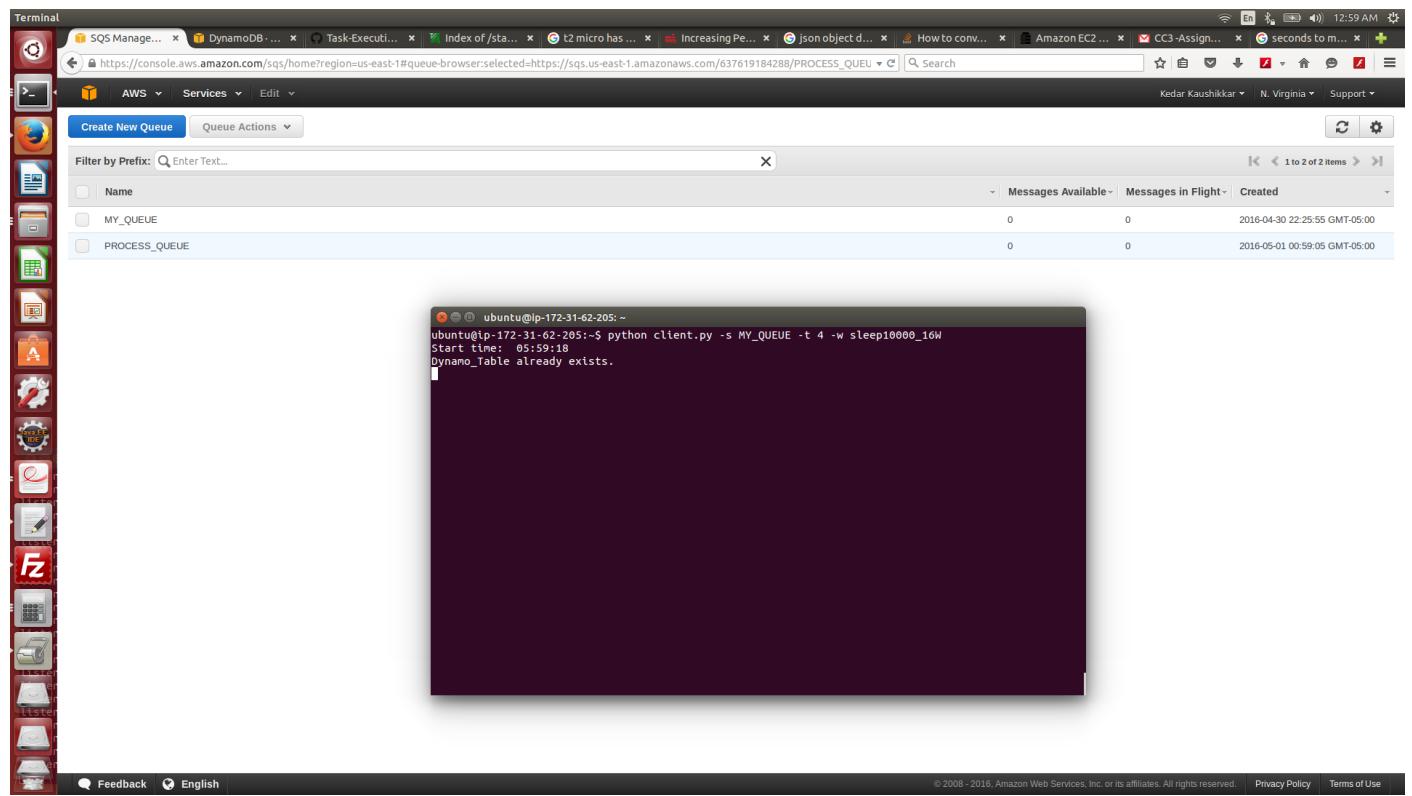
Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	80	0	2016-05-01 00:28:19 GMT-05:00

```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10000.8W
Start time: 05:29:43
Dynamo_Table already exists.
End time: 05:31:35
Total Tasks Processed : 88
Total Time Taken : 111.663650036
ubuntu@ip-172-31-62-205:~$
```

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Sleep 10sec – 16Workers



SQS Management Console - Mozilla Firefox

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	133	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	13	0	2016-05-01 00:59:05 GMT-05:00

Feedback English

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Terminal

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-04-30 22:25:55 GMT-05:00
PROCESS_QUEUE	160	0	2016-05-01 00:59:05 GMT-05:00

```
ubuntu@ip-172-31-62-205:~$ python client.py -s MY_QUEUE -t 4 -w sleep10000_16W
Start time: 05:59:18
Dynamo_Table already exists.
End time: 06:01:11
Total Tasks Processed : 160
Total Time Taken : 112.875922203
ubuntu@ip-172-31-62-205:~$
```

Feedback English

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ANIMOTO CLONE

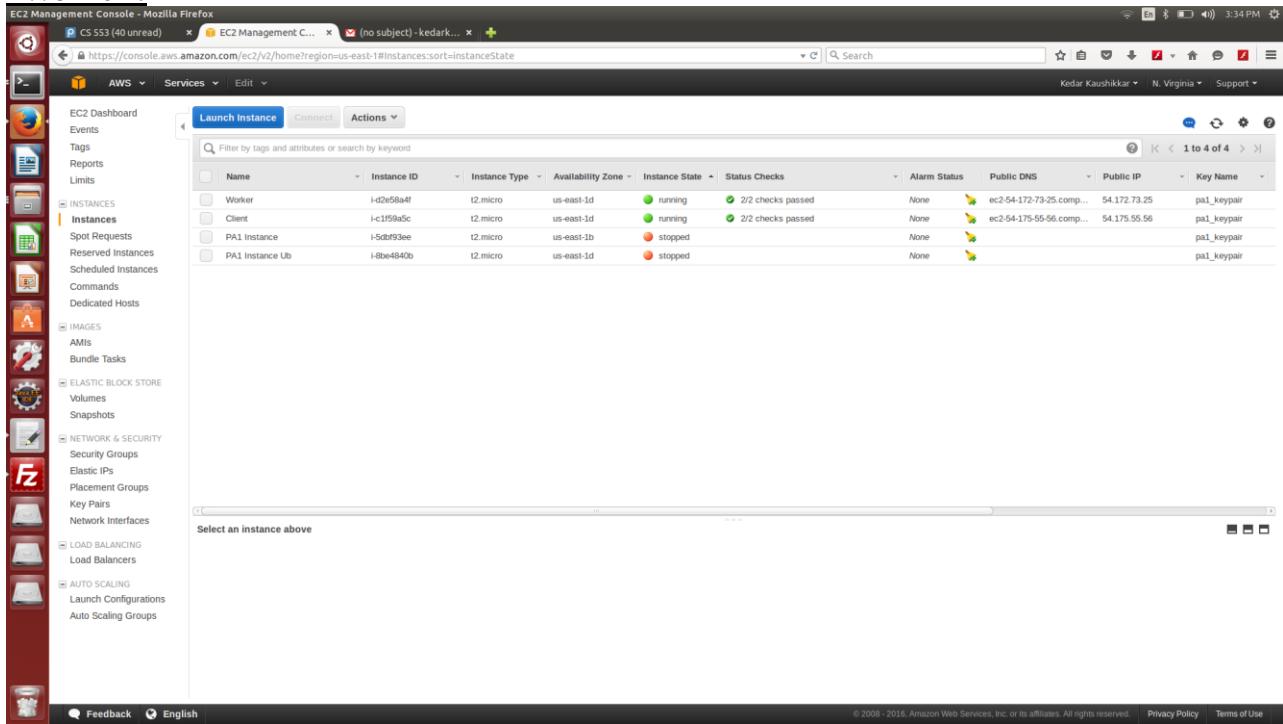
The experiments performed are used to create videos using images with the help of ffmpeg utility. We create a list of 60 image URL having image size of 1980 * 1080 and create 1 Job of this 60 images. 160 such jobs with each job of 60 images are pushed into SQS by the client and the worker picks up each job and using the ffmpeg utility creates a video of those 60 images.

The output of this experiment is 160 videos stored in Amazon S3 storage.

The Workers and Client used are on amazon t2. micro instances.

For this experiment, I have created a setup.sh bash file that processes each image from job and creates video attaching the next image passed to it.

1Worker :

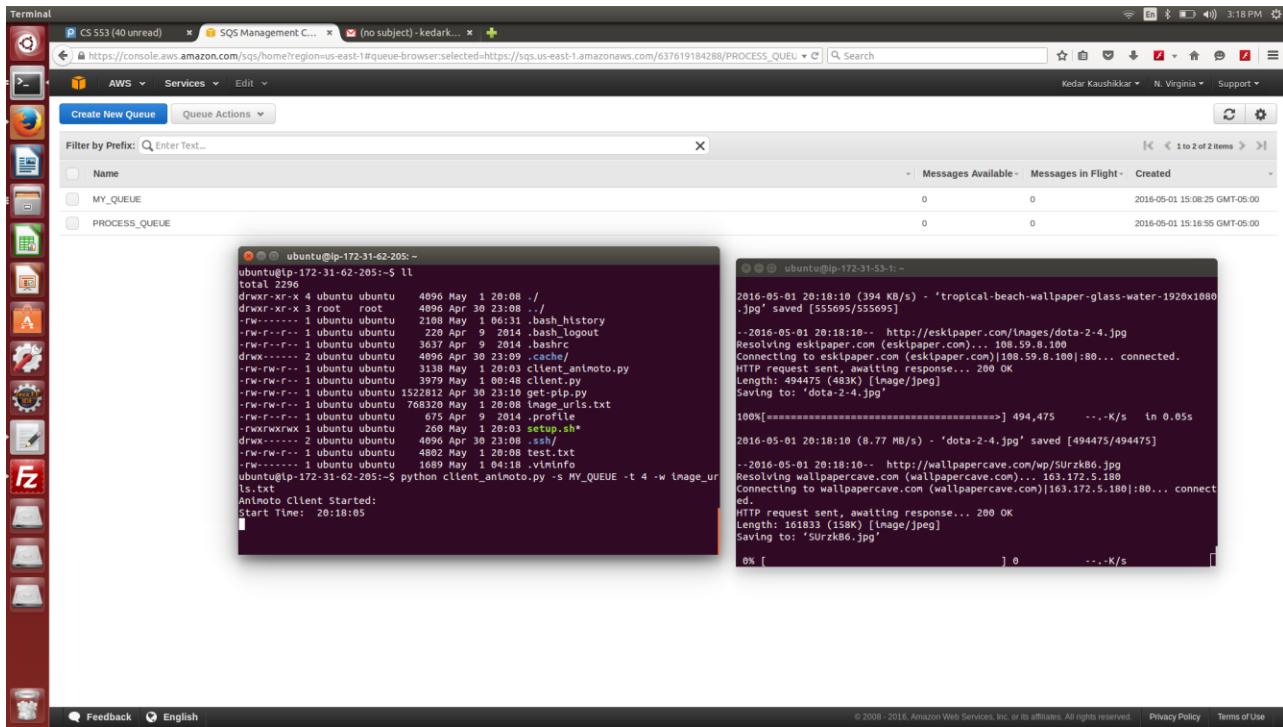


The screenshot shows the AWS EC2 Management Console interface. The left sidebar navigation bar includes links for EC2 Dashboard, Events, Tags, Reports, Limits, Instances (selected), Spot Requests, Reserved Instances, Scheduled Instances, Commands, Dedicated Hosts, AMIs, Bundle Tasks, Volumes, Snapshots, Security Groups, Elastic IPs, Placement Groups, Key Pairs, Network Interfaces, Load Balancers, Launch Configurations, and Auto Scaling Groups. The main content area displays a table of running instances:

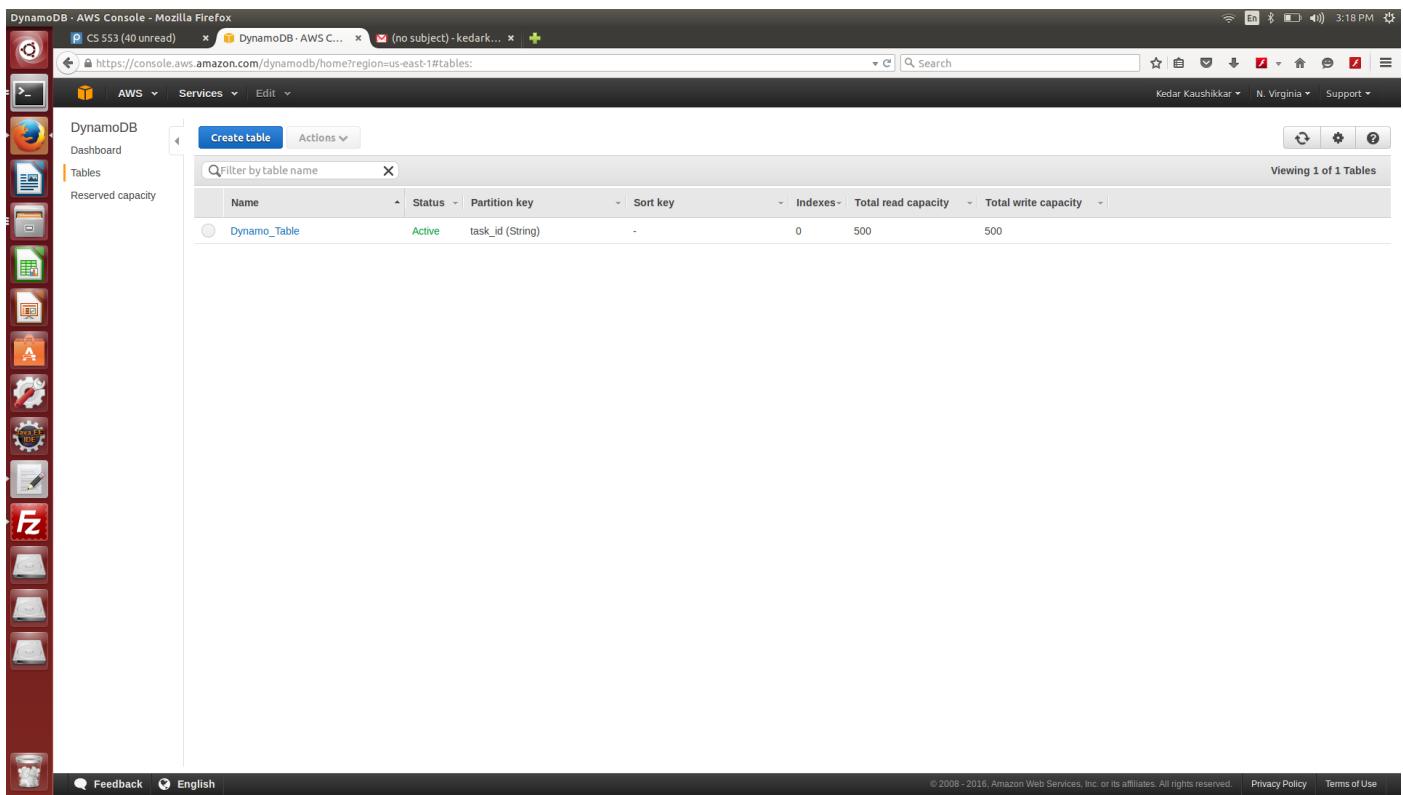
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-02e68a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-172-73-25.compute-1.amazonaws.com	54.172.73.25	pa1_keypair
Client	i-c1f9a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-175-55-56.compute-1.amazonaws.com	54.175.55.56	pa1_keypair
PA1 Instance	i-5db93ee	t2.micro	us-east-1b	stopped		None			pa1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped		None			pa1_keypair

A message at the bottom of the table says "Select an instance above". The status bar at the bottom of the browser window shows "Feedback English".

The above screenshot shows one client and one worker running on amazon EC2.



The screenshot displays the processing of every image on the worker instance.



SQS Management Console - Mozilla Firefox

CS 553 (33 unread) | SQS Management C... | (no subject) - kedark... | online code compar... | Text Comparison Se... | +

https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	3,720	0	2016-05-01 15:08:25 GMT-05:00
PROCESS_QUEUE	97	0	2016-05-01 15:16:55 GMT-05:00

Feedback English

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Terminal

CS 553 (33 unread) | S3 Management Con... | (no subject) - kedark... | online code compar... | Text Comparison Se... | +

https://console.aws.amazon.com/s3/home?region=us-east-1&bucket=pa3_animoto_bucket&prefix=

AWS Services Edit

Upload Create Folder Actions

All Buckets pa3_animoto_bucket

Name	Storage Class	Size	Last Modified
046e1b3cde75188642c236e4285662b	Standard	5.8 MB	Sun May 01 16:58:41 GMT-500 2016
07481a6484859721beb0a8c9f302df8	Standard	6 MB	Sun May 01 16:13:48 GMT-500 2016
0a20d2f9e3b083ba71e009c83a18043b	Standard	5.7 MB	Sun May 01 16:28:36 GMT-500 2016
0a311dc2b1fa59cdceb81656e039a33	Standard	5.2 MB	Sun May 01 16:21:51 GMT-500 2016
0b85b9aa96861185aa6fd1d0e1371ad	Standard	5.4 MB	Sun May 01 16:37:16 GMT-500 2016
0d9b603af6169d971aea06d07c71a	Standard	5.2 MB	Sun May 01 16:37:27 GMT-500 2016
0da950913fa3ea1c777bfc342d37	ubuntu@ip-172-31-62-205:~\$ clear		
121d53fe8a00b43486bc2ddce391e	total 296		
12535e65685d7c97427358648d3	ubuntu@ip-172-31-62-205:~\$ ll		
140201bd01b411c7137bfbe8c0b	drwxr-xr-x 4 ubuntu ubuntu 4096 May 1 04:18 .viminfo		
1442b699dd97734fc1c0a3a5b869cc0	drwxr-xr-x 3 root root 4096 Apr 30 23:08 ..		
1461e81fd21948b891c472fb92b	-rw-r--r- 1 ubuntu ubuntu 2108 May 1 06:31 .bash_history		
162c8a3597963d1a1340a596c31c	-rw-r--r- 1 ubuntu ubuntu 220 Apr 9 2014 .bash_logout		
17eeab07372956963f8febb97a1d	drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:09 .cache/		
199676d06fccb8a4c0942a5c74d8	-rw-rw-r- 1 ubuntu ubuntu 3138 May 1 20:03 client_animoto.py		
1998d186c020b409b0fa92	-rw-rw-r- 1 ubuntu ubuntu 3979 May 1 00:14 client.py		
1aa1ecnf1b4a8596b82aeab5e5c	-rw-rw-r- 1 ubuntu ubuntu 1522812 Apr 30 23:11 get-pip.py		
1ab2b1c1432bcd4d5cf77a7308034	-rwxrwxrwx 1 ubuntu ubuntu 260 May 1 20:03 setup.sh*		
1b0dc4ada13471220b42c739e6b0	drwx----- 2 ubuntu ubuntu 4096 Apr 30 23:08 ssh/		
2b62bbb6a6f32355edcc169a7e62	-rw----- 1 ubuntu ubuntu 4802 May 1 20:08 test.txt		
2c4c9a45b1320b41a707a1797	ubuntu@ip-172-31-62-205:~\$ python client_animoto.py -s MY_QUEUE -t 4 -w image_ur		
2d485186b3770f00901af98b36ed0	ls.txt		
3252a2df4bcb1ba3f675b5396dd0	Animoto Client Started:		
3e9f3e644a7595674457c6bd5e4496	Start Time: 20:18:05		
3e9f967bcc6fa09c212319721c2	Standard	5.4 MB	Sun May 01 16:49:47 GMT-500 2016
3f5639a0edd846df3788bbe03f18e4	Standard	5.3 MB	Sun May 01 17:03:20 GMT-500 2016
42909f192f129b839eddb45f77d50e	Standard	5.2 MB	Sun May 01 15:49:37 GMT-500 2016
47a812994e1c12ccfb3a3e0cba84b4	Standard	4.9 MB	Sun May 01 16:54:13 GMT-500 2016
47cecd7dc188a779ebc5e0144208d	Standard	5.9 MB	Sun May 01 16:59:47 GMT-500 2016
48c5503a5699fde7a8b288b2c71a5d33	Standard	5.3 MB	Sun May 01 16:03:33 GMT-500 2016
48e492f2736d5e2447be103a3e269487	Standard	5 MB	Sun May 01 15:27:11 GMT-500 2016

Feedback English

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The Screenshot shown above shows the processing while at the backend on the S3 storage , videos are being created and stored on the server.

S3 Management Console - Mozilla Firefox

CS 553 (3 unread) S3 Management Con... (no subject) - kedarka... online code compar... Text Comparison Se... +

https://console.aws.amazon.com/s3/home?region=us-east-1&bucket=pa3_animoto_bucket&prefix=

AWS Services Edit

Upload Create Folder Actions

All Buckets / pa3_animoto_bucket

Name	Storage Class	Size	Last Modified
046e1b3cd75188642c236e4285662b	Standard	5.8 MB	Sun May 01 16:58:41 GMT-500 2016
07481a6b48539721beb0a8c9f302dffe	Standard	6 MB	Sun May 01 16:13:48 GMT-500 2016
0a20d29f308083b71e009c83818043b	Standard	5.7 MB	Sun May 01 16:28:36 GMT-500 2016
0a311d5c2b1f2a59cd8eb1865e039a33	Standard	5.2 MB	Sun May 01 16:21:51 GMT-500 2016
0b85b9ae98681185aa6f2d10e01371ad	Standard	5.4 MB	Sun May 01 16:37:16 GMT-500 2016
0d9b603a6f169d971eaed6d07c71a454	Standard	5.3 MB	Sun May 01 16:27:35 GMT-500 2016
0da950913fa3ea0c777dbfc342d37f2	Standard	5.6 MB	Sun May 01 15:47:32 GMT-500 2016
121d53fe8a0b84368db2ddce391e5a	Standard	4.9 MB	Sun May 01 16:38:22 GMT-500 2016
1233e56e5685d7c97427358648d3d23c	Standard	5.4 MB	Sun May 01 16:50:48 GMT-500 2016
14020180b1b411e71378bf0eb8c0bcf6	Standard	6.1 MB	Sun May 01 15:26:05 GMT-500 2016
1442b69add97734fc1c03a5b869c01c	Standard	5.3 MB	Sun May 01 15:52:02 GMT-500 2016
1461e01fd21948b891c472fbfd92bb1	Standard	4.9 MB	Sun May 01 16:14:57 GMT-500 2016
162c8a3b597963d1a1340e596c31c3f	Standard	5.2 MB	Sun May 01 15:55:16 GMT-500 2016
17e0a80737295696e38f0ebbd97a1d6f	Standard	5.8 MB	Sun May 01 17:07:59 GMT-500 2016
199676d06fc8a4c509425a7c74da66	Standard	4.7 MB	Sun May 01 16:07:52 GMT-500 2016
1998d18e03f208adfc24409b0fa92b4	Standard	5.9 MB	Sun May 01 16:35:19 GMT-500 2016
1aa1eacf1b4a48596beeb82eab5e9c	Standard	5.6 MB	Sun May 01 15:22:27 GMT-500 2016
1ab2bc1f432bcd4d5cf727a30803437	Standard	5.4 MB	Sun May 01 15:45:11 GMT-500 2016
1b0dc44af1347b1220c2e739ee6baff	Standard	5.2 MB	Sun May 01 15:48:30 GMT-500 2016
2b62bbb6a6f32355ed6cc169ae6226	Standard	6 MB	Sun May 01 15:31:44 GMT-500 2016
2c24c9aa5b13f20bb41a707a17197a34	Standard	5.3 MB	Sun May 01 15:36:18 GMT-500 2016
2d485186b23770f00901a98b36e6f53	Standard	5 MB	Sun May 01 15:33:48 GMT-500 2016
3252a2dfbf4bc1baa3f675b83966dd8	Standard	5.5 MB	Sun May 01 16:45:19 GMT-500 2016
3a9f3e644a75959674457c6bd5e64496	Standard	5.2 MB	Sun May 01 16:20:31 GMT-500 2016
3e9f967bccfa0a9c212319707821c2	Standard	5.4 MB	Sun May 01 16:49:47 GMT-500 2016
3f5639a0ed846d6f37888be0a3f18e4	Standard	5.3 MB	Sun May 01 17:03:20 GMT-500 2016
42990f192f3129b839edd45f777d50e	Standard	5.2 MB	Sun May 01 15:49:37 GMT-500 2016
478a12994e1c12ccfa33e0cb8a4b4c	Standard	4.9 MB	Sun May 01 16:54:13 GMT-500 2016
47fced7dc1885a7979ebc5e0144208d	Standard	5.9 MB	Sun May 01 16:59:47 GMT-500 2016
48c5503a56999de7a8b288b2c71a5d33	Standard	5.3 MB	Sun May 01 16:03:33 GMT-500 2016
48e492f2736d5e2447b1e03a3e269487	Standard	5 MB	Sun May 01 15:27:11 GMT-500 2016

Feedback English

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The screenshot shows all the videos created after processing each job.

SQS Management Console - Mozilla Firefox

CS 553 (3 unread) SQS Management C... Inbox - kedarkaushi... online code compar... Text Comparison Se... minutes to seconds ... +

https://console.aws.amazon.com/sqs/home?region=us-east-1

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-05-01 17:35:37 GMT-05:00
PROCESS_QUEUE	160	0	2016-05-01 17:35:44 GMT-05:00

Feedback English

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All the 160 jobs are processed at the end of the experiment.

2 Workers:

The screenshot shows the AWS EC2 Management Console interface. On the left, there's a sidebar with various service icons. The main area displays a table of instances. The columns include Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS, Public IP, and Key Name. There are six instances listed:

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-d2e58a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-172-73-25.comp...	54.172.73.25	pa1_keypair
worker 2	i-4ef09bd3	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-205-252-70.comp...	52.205.252.70	pa1_keypair
Client	i-c1f59a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-175-55-56.comp...	54.175.55.56	pa1_keypair
PA1 Instance	i-5cbfb93ee	t2.micro	us-east-1b	stopped		None			pa1_keypair
In_memory	i-9baef06	t2.micro	us-east-1d	stopped		None			pa1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped		None			pa1_keypair

Below the table, a message says "Select an instance above". At the bottom of the page, there are links for Feedback, English, and other AWS terms.

The screenshot shows two terminal windows on an Ubuntu system. The left terminal window shows the user downloading a file from wfiles.brothersoft.com:

```
HTTP request sent, awaiting response... 200 OK
Length: 194922 (190K) [image/jpeg]
Saving to: 'red-porsche-carrera-gt-wallpaper-wallpaper-2.jpg'

100%[=====] 194,922     ...K/s  in 0.03s
2016-05-01 22:48:46 (5.87 MB/s) - 'red-porsche-carrera-gt-wallpaper-wallpaper-2.jpg' saved [194922/194922]

--2016-05-01 22:48:46-- http://wfiles.brothersoft.com/t/the-spring_196151-1920x1080.jpg
Resolving wfiles.brothersoft.com (wfiles.brothersoft.com)... 75.126.20.75
Connecting to wfiles.brothersoft.com (wfiles.brothersoft.com)|75.126.20.75|:80...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 544951 (532K) [image/jpeg]
Saving to: 'the-spring_196151-1920x1080.jpg'

100%[=====]
```

The right terminal window shows the user downloading a file from dekhnnews.com:

```
System information as of Sun May  1 20:08:07 UTC 2016
[544951]
System load: 0.0      Processes:          107
Usage of /: 10.2% of 7.74GB  Users logged in: 1
Memory usage: 8%          IP address for eth0: 172.31.62.205
Swap usage: 0%
Graph this data and manage this system at:
https://landscape.canonical.com/
Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud
0 packages can be updated.
0 updates are security updates.

Last login: Sun May  1 20:05:33 2016 from 104.194.107.59
ubuntu@ip-172-31-62-205:~$ python client_animoto.py -s MY_QUEUE -t 4 -w image_ur
ls.txt
Animoto Client Started:
Start Time: 22:48:40
```

Both terminals show the progress of the download process, indicating speeds of approximately 5.87 MB/s and 61.2 MB/s respectively.

S3 Management Console - Mozilla Firefox

CS 553 (33 unread) S3 Management Con... Inbox - kedarkaushi... online code compar... Text Comparison Se... New Tab

https://console.aws.amazon.com/s3/home?region=us-east-1&bucket=pa3_animoto_bucket&prefix=

AWS Services Edit

Upload Create Folder Actions

All Buckets / pa3_animoto_bucket

Name	Storage Class	Size	Last Modified
0185df9b7171d455e3e6f6fb1b72c0f3c	Standard	4.9 MB	Sun May 01 18:25:40 GMT-500 2016
030663f6beab533c92a3e2e18f5f00a	Standard	4.9 MB	Sun May 01 18:39:41 GMT-500 2016
05e68f79be2e66b71696d95a1e3e5c1	Standard	4.6 MB	Sun May 01 18:36:30 GMT-500 2016
06644aca8cc8e3b1b72468b51cd47b1348	Standard	5 MB	Sun May 01 18:47:50 GMT-500 2016
0a299da298a93f5778ac93682b78d703	Standard	5.4 MB	Sun May 01 19:03:48 GMT-500 2016
0d924a48c0b699eb6b4ba2984e3661bd	Standard	5.6 MB	Sun May 01 18:42:22 GMT-500 2016
0e56d718de83207e8de3cde3d93098	Standard	340 KB	Sun May 01 17:51:03 GMT-500 2016
0e926c43e90ddaa8ae847d288060d012	Standard	5.6 MB	Sun May 01 18:31:26 GMT-500 2016
10f6d499c90c24a294a72c5b40d34d362	Standard	5.7 MB	Sun May 01 17:52:59 GMT-500 2016
122abf80ab1bf65e64fa797e607b92c	Standard	5 MB	Sun May 01 19:07:21 GMT-500 2016
18b9fc5f92064260d5342d4e360171	Standard	5.5 MB	Sun May 01 19:00:36 GMT-500 2016
1921256c48e5b61267600b18446dd92	Standard	4.2 MB	Sun May 01 18:34:47 GMT-500 2016
1c426c277e110b7075259a027a84b82	Standard	4.8 MB	Sun May 01 18:06:13 GMT-500 2016
1cfad9b89040fb72fc4d216f18d40fe2	Standard	5.3 MB	Sun May 01 17:52:06 GMT-500 2016
1d9d9d2c9930eb2967d7c1fa03ac413e	Standard	4.9 MB	Sun May 01 17:59:44 GMT-500 2016
20b9fd5d5eb3f58c87fa5fcfb97f4aae	Standard	5.1 MB	Sun May 01 18:32:23 GMT-500 2016
20c04a22459c39c42d8b35ee831ebf7e	Standard	5.5 MB	Sun May 01 19:11:57 GMT-500 2016
23b37910ba870f9bb1aa9feb31a6a19c	Standard	5.8 MB	Sun May 01 19:07:47 GMT-500 2016
266d44c1c142beb2e6064aeb0a3e526	Standard	5.6 MB	Sun May 01 18:53:48 GMT-500 2016
271346556e799d0a896ed0a4b9fb9d93e	Standard	5.3 MB	Sun May 01 18:42:58 GMT-500 2016
289164984791e825494ac097b8244d9f	Standard	5.8 MB	Sun May 01 18:21:58 GMT-500 2016
29acf0c10f28e13de377829677ba7	Standard	5.2 MB	Sun May 01 18:13:54 GMT-500 2016
2c742eca3b6c15e9d9ef8ee7c1d8de	Standard	5.3 MB	Sun May 01 18:52:37 GMT-500 2016
2c74f2c7033462fb91e48ala9d0660	Standard	5 MB	Sun May 01 18:11:43 GMT-500 2016
33550037719b099d33ae30ffd5057331	Standard	5.3 MB	Sun May 01 18:29:23 GMT-500 2016
33e7f3ccceac6671e9192379423b7949b	Standard	4.9 MB	Sun May 01 18:17:01 GMT-500 2016
34b615091e8def2d05a355589890a05c6	Standard	5.3 MB	Sun May 01 18:59:41 GMT-500 2016
358a570c9439c23846232c7c6291dca	Standard	5.9 MB	Sun May 01 19:06:06 GMT-500 2016
37d2f6609e8bd384a03e7fc02df84a2	Standard	5.2 MB	Sun May 01 18:34:22 GMT-500 2016
388e72cdf8c16b4535b0aae940972d5	Standard	5.3 MB	Sun May 01 19:06:43 GMT-500 2016
396b634bc6f3495bf7b56517fcfa83	Standard	5.3 MB	Sun May 01 18:55:47 GMT-500 2016

Feedback English

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SQS Management Console - Mozilla Firefox

CS 553 (33 unread) SQS Management C... Inbox - kedarkaushi... online code compar... Text Comparison Se... minutes to seconds ...

https://console.aws.amazon.com/sqs/home?region=us-east-1

AWS Services Edit

Create New Queue Queue Actions

Filter by Prefix: EnterText...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-05-01 17:35:37 GMT-05:00
PROCESS_QUEUE	160	0	2016-05-01 17:35:44 GMT-05:00

Feedback English

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4 Workers:

```

Input stream #0:0 frame changed from size:1920x1080 fmt:yuvj44p to size:1920x10
80 fmt:yuvj420p [swscaler @ 0x2543160] deprecated pixel format used, make sure you did set range
correctly
Input stream #0:0 frame changed from size:1920x1080 fmt:yuvj420p to size:1920x10
80 fmt:yuvj44p [swscaler @ 0x2543160] deprecated pixel format used, make sure you did set range
correctly
Input stream #0:0 frame changed from size:1920x1080 fmt:yuvj44p to size:1920x10
80 fmt:yuvj420p [swscaler @ 0x2543160] deprecated pixel format used, make sure you did set range
correctly
frame= 73 fps= 23 q=24.8 size= 5252kB time=00:00:02.84 bitrate=15149.4kbit/s
frame= 75 fps= 20 q=24.8 size= 5452kB time=00:00:02.92 bitrate=15295.5kbit/s
Input stream #0:0 frame changed from size:1920x1080 fmt:yuvj420p to size:1920x10
80 fmt:yuvj44p [swscaler @ 0x2543160] deprecated pixel format used, make sure you did set range
correctly
pipe:: Input/output error
frame= 76 fps= 20 q=24.8 size= 5552kB time=00:00:03.00 bitrate=15160.7kbit/s
video:5530kB audio:0kB subtitle:0kB other streams:0kB global headers:0kB muxing
overhead: 0.394816%

```

```

ubuntu@lp-172-31-61-211: ~
628192.jpg
Resolving www.planwallpaper.com (www.planwallpaper.com)... 104.24.127.96, 104.24
.126.96
Connecting to www.planwallpaper.com (www.planwallpaper.com)|104.24.127.96|:80...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 129704 (127K) [Image/jpeg]
Saving to: 'wallpaper-11628192.jpg'

100%[=====] 129,704 724KB/s in 0.2s
2016-05-02 01:44:28 (724 KB/s) - 'wallpaper-11628192.jpg' saved [129704/129704]

--2016-05-02 01:44:28-- http://www.planwallpaper.com/static/images/rainbow-wall
paper-1_10QDwBH.jpg
Resolving www.planwallpaper.com (www.planwallpaper.com)... 104.24.126.96, 104.24
.127.96
Connecting to www.planwallpaper.com (www.planwallpaper.com)|104.24.126.96|:80...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 462462 (452K) [Image/jpeg]
Saving to: 'rainbow-wallpaper-1_10QDwBH.jpg'

100%[=====] 170,983 715KB/s

```

```

3... Connected.
HTTP request sent, awaiting response... 200 OK
Length: 1082105 (1.0M) [Image/jpeg]
Saving to: '516663.jpg.p1'

100%[=====] 1,082,105 ---K/s in 0.62s
2016-05-02 01:44:24 (45.3 MB/s) - '516663.jpg.p1' saved [1082105/1082105]

--2016-05-02 01:44:24-- https://vtl.blowarecdn.ea.com/vt1.vt1blowarecdn.ea.com/vf/rgames/blow
are/masseffect/desktop_20/masseffect2_wallpaper_04_hd_1920x1080.jpg
Resolving vtl.blowarecdn.ea.com (vtl.blowarecdn.ea.com)... 8.247.89.221
Connecting to vtl.blowarecdn.ea.com (vtl.blowarecdn.ea.com)|8.247.89.221|:80
HTTP request sent, awaiting response... 200 OK
Length: 705507 (689K) [Image/jpeg]
Saving to: 'masseffect2_wallpaper_04_hd_1920x1080.jpg.p1'

100%[=====] 705,507 669KB/s in 1.0s
2016-05-02 01:44:25 (669 KB/s) - 'masseffect2_wallpaper_04_hd_1920x1080.jpg.p1' saved [705507/705507]

```

```

>>>Detail</>/Error>RequestId=ed3e8bbd-65ae-58bb-8722-44ad9c90e225</RequestId>/E
HTTP request sent, awaiting response... 200 OK
Length: 316880 (309K) [Image/jpeg]
Saving to: 'virtus_pro.jpg'

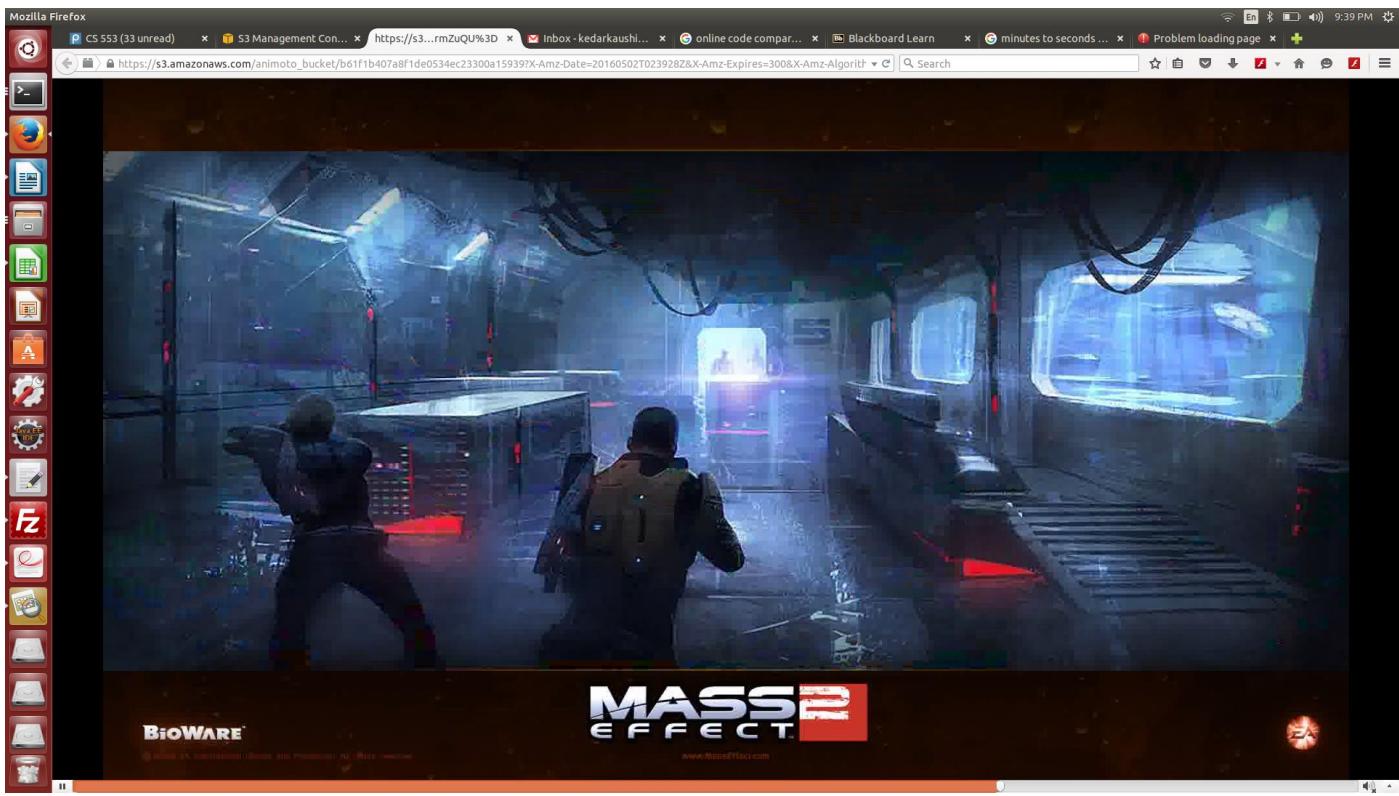
100%[=====] 316,880 ---K/s in 0.009s
2016-05-02 01:44:24 (33.5 MB/s) - 'virtus_pro.jpg' saved [316880/316880]

--2016-05-02 01:44:24-- http://www.planwallpaper.com/www.planwallpaper.com|104.24.126.96|:80...
Resolving www.planwallpaper.com (www.planwallpaper.com)... 104.24.126.96, 104.24
.127.96
Connecting to www.planwallpaper.com (www.planwallpaper.com)|104.24.126.96|:80...
connected.
HTTP request sent, awaiting response... 200 OK
Length: 136240 (133K) [Image/jpeg]
Saving to: '7678666-1080p-wallpapers.jpg'

100%[=====] 136,240 771KB/s in 0.2s
2016-05-02 01:44:24 (771 KB/s) - '7678666-1080p-wallpapers.jpg' saved [136240/13
6240]

```

Name	Storage Class	Size	Last Modified
0110b30ae1de7bb10fcf621bc40ae77	Standard	5.1 MB	Sun May 01 21:22:24 GMT-500 2016
0180d73de27c798968b3f056bf3f9eb	Standard	5.4 MB	Sun May 01 20:51:51 GMT-500 2016
01a42a926df1cd4b48f8157a2dc696d1	Standard	5.9 MB	Sun May 01 20:51:30 GMT-500 2016
030f8bab0d615dbd3e34cc150b8be4e	Standard	6.6 MB	Sun May 01 20:43:42 GMT-500 2016
05fafade518f30a503959f495e547f20	Standard	5 MB	Sun May 01 21:22:22 GMT-500 2016
063ee5b7a19885976105b85434fcfb3	Standard	5 MB	Sun May 01 20:45:54 GMT-500 2016
07fa1bbb04102e7364ac5347319706	Standard	5.4 MB	Sun May 01 20:48:17 GMT-500 2016
095b4d64edecc62cf8a0fffa5dc4d	Standard	5.2 MB	Sun May 01 21:01:10 GMT-500 2016
0a5c64d747f9ccc69027dac7eb134962	Standard	5.3 MB	Sun May 01 21:04:20 GMT-500 2016
0bc8cda3a6c6dcd9a90f913746cab50	Standard	5.6 MB	Sun May 01 20:45:57 GMT-500 2016
0cc802bb6b7e922ec5d50026805eb77	Standard	5.1 MB	Sun May 01 21:21:07 GMT-500 2016
0cf4f12a391030c30912bca997770971	Standard	5.3 MB	Sun May 01 21:12:06 GMT-500 2016
0db40c6d2f0e624a7074bb9e9846f26	Standard	5.1 MB	Sun May 01 20:52:49 GMT-500 2016
0e913c8fc541b61da725a030581ad	Standard	5.3 MB	Sun May 01 21:27:56 GMT-500 2016
1247c5a577c85d5d4669098e65f6010	Standard	4.9 MB	Sun May 01 21:11:59 GMT-500 2016
1ab683735ea513225ead6ea44f18ef7	Standard	5.5 MB	Sun May 01 21:03:14 GMT-500 2016
1bd4d63669p00be7e23c260e2a67b71	Standard	6 MB	Sun May 01 21:07:30 GMT-500 2016
1b052bee74806aaaa94ddc1d513d6ab	Standard	5.6 MB	Sun May 01 21:31:28 GMT-500 2016
1bb6b2abb2e0a0f86504438cc0125cdf3	Standard	5.1 MB	Sun May 01 21:04:47 GMT-500 2016
1dsd2907aa989d57525492bdbca228	Standard	5.6 MB	Sun May 01 21:09:54 GMT-500 2016
1dce0caa0ba4b9f7f1ubae9c01fb6	Standard	5.5 MB	Sun May 01 21:07:40 GMT-500 2016
217ccc785a5765bb09f8527389a8655	Standard	5.2 MB	Sun May 01 21:05:30 GMT-500 2016
239099a28c9d250995a883357c8	Standard	4.7 MB	Sun May 01 21:31:25 GMT-500 2016
255298748c137757f9d3c05e202d6	Standard	5.8 MB	Sun May 01 20:54:17 GMT-500 2016
25866ea0392b2d96a643797589502c86	Standard	4.8 MB	Sun May 01 20:56:29 GMT-500 2016
270805733618416ee80c71ce6b6bf	Standard	5.8 MB	Sun May 01 21:00:58 GMT-500 2016
27186652636b6e6655ae1714947469568	Standard	5.6 MB	Sun May 01 21:23:02 GMT-500 2016
271ac7644b4d2a2d7acf0e851803ce32	Standard	5.7 MB	Sun May 01 21:21:43 GMT-500 2016
2a99c30ad9c4a6f97af669541f1d73	Standard	5 MB	Sun May 01 20:57:36 GMT-500 2016
2b5bb057ab9bafaf9fc46818a0d99cc	Standard	5.4 MB	Sun May 01 21:11:34 GMT-500 2016



Above screenshot is the snippet of the video running and one of the images out of 60 are shown in the screenshot.

8 Workers:

EC2 Management Console - Mozilla Firefox

https://console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:sort=instanceState

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP	Key Name
Worker	i-2e658a4f	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-172-73-25.compute...	54.172.73.25	pa1_keypair
Worker 5	i-2b07d0b0	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-226-215.com...	54.88.226.215	pa1_keypair
Worker 6	i-50b7d4cd	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-88-160-234.com...	54.88.160.234	pa1_keypair
Worker 7	i-53b7d4ce	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-84-153-236.com...	54.84.153.236	pa1_keypair
Worker 8	i-52b7d0cf	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-87-181-226.com...	54.87.181.226	pa1_keypair
Worker 4	i-5d6e2420	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-91-226-248.com...	52.91.226.248	pa1_keypair
Worker 2	i-234125be	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-172-18-247.com...	54.172.18.247	pa1_keypair
Worker 3	i-224252ef	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-52-205-250-203.co...	52.205.250.203	pa1_keypair
Client	i-c1f59a5c	t2.micro	us-east-1d	running	2/2 checks passed	None	ec2-54-175-55-56.compute...	54.175.55.56	pa1_keypair
PA1 Instance	i-5d0f93ee	t2.micro	us-east-1b	stopped	-	None	-	-	pa1_keypair
In_memory	i-9ba4cfd6	t2.micro	us-east-1d	stopped	-	None	-	-	pa1_keypair
PA1 Instance Ub	i-8be4840b	t2.micro	us-east-1d	stopped	-	None	-	-	pa1_keypair

Instance: i-c1f59a5c (Client) Public DNS: ec2-54-175-55-56.compute-1.amazonaws.com

Description Status Checks Monitoring Tags

Instance ID: i-c1f59a5c	Instance state: running	Public DNS: ec2-54-175-55-56.compute-1.amazonaws.com
Instance type: t2.micro	Private DNS: ip-172-31-62-205.ec2.internal	Public IP: 54.175.55.56
Private IPs: 172.31.62.205	Availability zone: us-east-1d	Elastic IP: -
Secondary private IPs: VPC ID: vpc-f63249a	Security groups: launch-wizard-52, view rules	AMI ID: ubuntu-trusty-14.04-amd64-server-20160114.5 (ami-1cc699)
Subnet ID: subnet-6f40c45	Scheduled events: No scheduled events	Platform: -

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```

ubuntu@ip-172-31-62-285:~$ Last login: Mon May 2 06:28:20 2016 from 104.194.107.59
ubuntu@ip-172-31-62-285:~$ 
[147815/147815]
--2016-05-02 02:40:00 (13.9 KB/s) - 'colorado-landscape-summer-wallpaper-4.jpg' saved [100/100282/100282]
[147815/147815]
..2016-05-02 02:40:09.. http://pic.ifotonin.com/data/wallpapers/186/WDF_2245835.jpg
Resolving pic.ifotonin.com (pic.ifotonin.com)... 178.63.68.285
Connecting to pic.ifotonin.com (pic.ifotonin.com)|178.63.68.285|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 89784 (88K) [Image/jpeg]
Saving to: 'WDF_2245835.jpg'
100%[=====] 89,783 311KB/s 0n 0.3s
2016-05-02 02:48:10 (311 KB/s) - 'WDF_2245835.jpg' saved [9783/9783]
[147815/147815]
..2016-05-02 02:48:10.. http://www.wallapersultah.eu/wp-content/gallery/full_hd-wallpapers/1920x1080/3d-wide-wallpapers-1920x1080.jpg
Resolving www.wallapersultah.eu (www.wallapersultah.eu)... 237.10.107.20
2000-ice911@home-OptiPlex-540:~$ python client_animoto.py -s NY_QUEUE -t 4 -w image_ur
Connecting to www.wallapersultah.eu (www.wallapersultah.eu)|237.10.107.20|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 89784 (88K) [Image/jpeg]
Saving to: 'image_ur'
[147815/147815]
..2016-05-02 02:48:10 (88K) [Image/jpeg]
Saving to: '3d-wide-wallpapers-1920x1080.jpg'
100%[=====] 89,783 311KB/s 0n 0.3s
2016-05-02 02:48:10 (181 KB/s) - '3d-wide-wallpapers-1920x1080.jpg' saved [37995/37995]
[147815/147815]
..2016-05-02 02:48:10.. http://wallarthd.com/wp-content/uploads/2016/03/Love-Is
land-Beauty_1920x1080.jpg
Resolving wallarthd.com (wallarthd.com)... 188.179.235.108
Connecting to wallarthd.com (wallarthd.com)|188.179.235.108|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 718978 (709K) [Image/jpeg]
Saving to: 'Love-Island-Beauty_1920x1080.jpg'
[147815/147815]
..2016-05-02 02:48:11 (845 KB/s) - 'Love-Island-Beauty_1920x1080.jpg' saved [421309/421309]
[147815/147815]
..2016-05-02 02:48:11.. http://pic.ifotonin.com/data/wallpapers/152/WDF_1931082.jpg
Resolving pic.ifotonin.com (pic.ifotonin.com)... 178.63.68.285
Connecting to pic.ifotonin.com (pic.ifotonin.com)|178.63.68.285|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 718978 (709K) [Image/jpeg]
Saving to: 'WDF_1931082.jpg'
[147815/147815]
..2016-05-02 02:48:11.. http://wallarthd.com/wp-content/uploads/2016/03/Love-Is
land-Beauty_1920x1080.jpg
Resolving wallarthd.com (wallarthd.com)... 188.179.235.108
Connecting to wallarthd.com (wallarthd.com)|188.179.235.108|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 718978 (709K) [Image/jpeg]
Saving to: 'Love-Island-Beauty_1920x1080.jpg'
[147815/147815]
..2016-05-02 02:48:11.. http://www.kupywrestlingwallpapers.info/wallpapers/192
0x1080/kunimitsugirl1.com_(kunimitsugirl1.com)... 64.129.26.29
Connecting to kunimitsugirl1.com (kunimitsugirl1.com)|64.129.26.29|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 421948 (412K) [Image/jpeg]
Saving to: 'Evolution-evolution_1920x1080.jpg'
[147815/147815]
..2016-05-02 02:48:11.. http://www.elitedangerous.com/_medu/wallpapers/wallpa
per-04-1920x1080.jpg
Resolving www.elitedangerous.com (www.elitedangerous.com)... 54.154.121.55, 52.1
9.35.24
Connecting to www.elitedangerous.com (www.elitedangerous.com)|54.154.121.55|:443
[147815/147815]
..2016-05-02 02:48:11.. http://www.elitedangerous.com/_medu/wallpapers/wallpa
per-04-1920x1080.jpg
Resolving www.elitedangerous.com (www.elitedangerous.com)... 54.154.121.55, 52.1
9.35.24
Connecting to www.elitedangerous.com (www.elitedangerous.com)|54.154.121.55|:443
HTTP request sent, awaiting response... 200 OK
Length: 542476 (530K) [Image/jpeg]
Saving to: 'elidannerous_1920x1080.jpg'
[147815/147815]
55%[=====] 382,767 723KB/s
[147815/147815]
..2016-05-02 02:48:10 (2.78 MB/s) - 'shinsuke-nakamura-wallpaper-1920x1080.jpg' s
aved [590986/590986]
[147815/147815]
..2016-05-02 02:48:10.. http://wallpapercave.com/w/pwF15n.jpg
Resolving wallpapercave.com (wallpapercave.com)... 163.172.5.188
Connecting to wallpapercave.com (wallpapercave.com)|163.172.5.188|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 110051 (110K) [Image/jpeg]
Saving to: 'pwF15n.jpg'
[147815/147815]
40%[=====] 45,998 161KB/s
[147815/147815]
..2016-05-02 02:48:10 (537 KB/s) - 'rainbow-wallpaper_1_lQw00H.jpg' saved [462462/462462]
[147815/147815]
..2016-05-02 02:48:10.. http://art-of-lol.com/wp-content/uploads/2015/09/R03EC
T-Lucian-League-of-Legends-Wallpapers-1920x1080.jpg
Resolving art-of-lol.com (art-of-lol.com)... 185.78.20.20
2000-ice911@home-OptiPlex-540:~$ python client_animoto.py -s NY_QUEUE -t 4 -w image_ur
Connecting to art-of-lol.com (art-of-lol.com)|185.78.20.20|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1645999 (1.4M) [Image/jpeg]
Saving to: 'R03EC-T-Lucian-League-of-Legends-Wallpapers-HD-1920x1080.jpg'
[147815/147815]
38 [>] 56,013 231KB/s

```

SQS Management Console - Mozilla Firefox

CS 553 (33 unread) SQS Management C... Inbox - kedarkaushik... Blackboard Learn minutes to seconds... Problem loading page

<https://console.aws.amazon.com/sqs/home?region=us-east-1#queue-browser:prefix=>

Create New Queue Queue Actions

Filter by Prefix: Enter Text...

Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-05-01 20:30:26 GMT-05:00
PROCESS_QUEUE	160	0	2016-05-01 21:42:43 GMT-05:00

Feedback English

Highlight All Match Case 1 of 1 match

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19:14

S3 Management Console - Mozilla Firefox

CS 553 (33 unread) S3 Management Con... Inbox - kedarkaushi... Blackboard Learn minutes to seconds... Problem loading page

https://console.aws.amazon.com/s3/home?region=us-east-1&bucket=animoto_bucket&prefix= AWS Services Edit

Upload Create Folder Actions

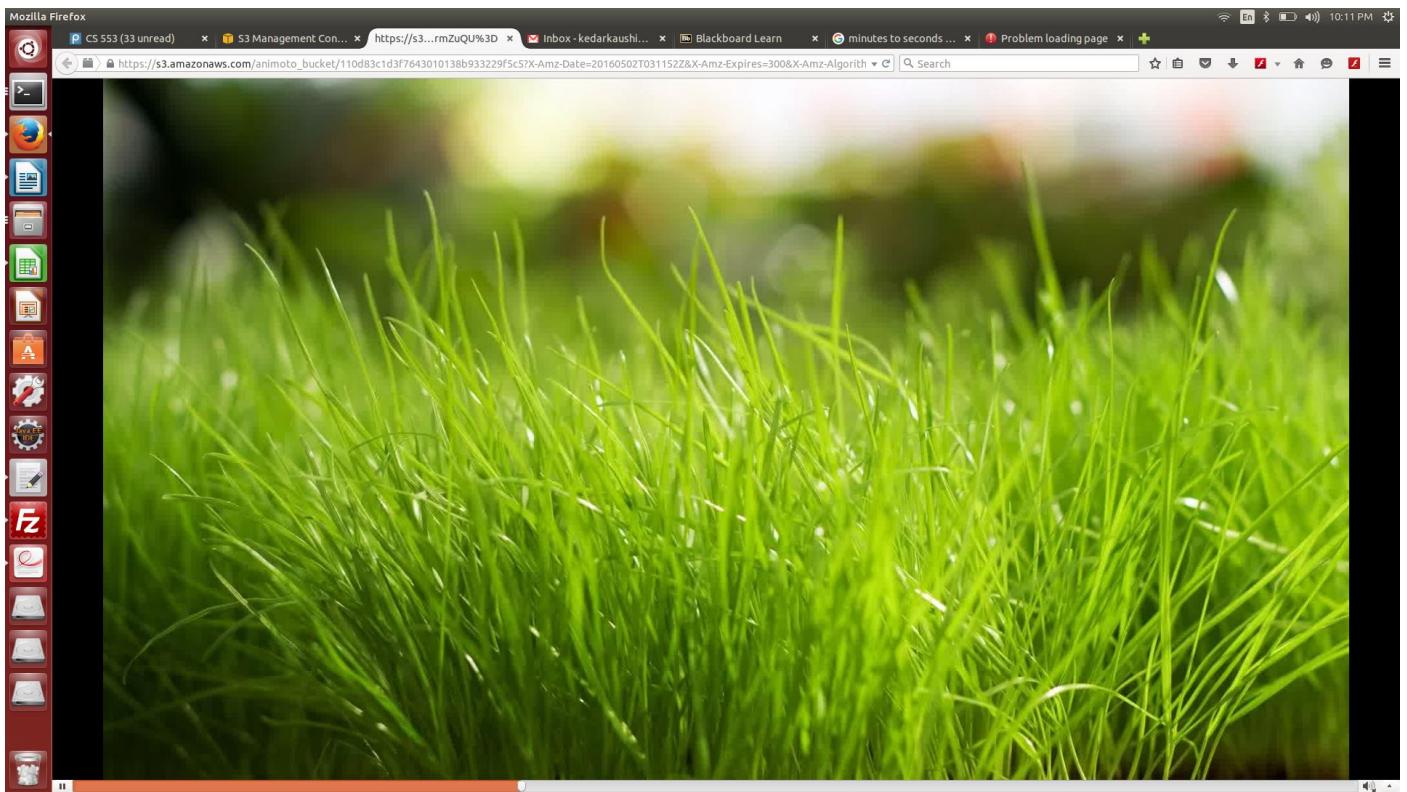
All Buckets / animoto_bucket

Name	Storage Class	Size	Last Modified
03e637808215cef71df87b254f427c155	Standard	5.7 MB	Sun May 01 22:02:39 GMT-500 2016
03e22c52c9e3854328c792add36350e9	Standard	5.3 MB	Sun May 01 21:52:14 GMT-500 2016
046a8b498b0133aae0d9d9c85e6766018e	Standard	5.4 MB	Sun May 01 21:51:47 GMT-500 2016
0614ec02477f5ca0b5c5737e9dabb	Standard	5.3 MB	Sun May 01 22:03:19 GMT-500 2016
079a46201cb886329efda4f473ebef57	Standard	5.6 MB	Sun May 01 22:09:10 GMT-500 2016
0a6bc45503217e0eb7b68777f695d4ad	Standard	6 MB	Sun May 01 21:55:09 GMT-500 2016
0ca4e6b5b17db94c461dcf59975bc4c	Standard	5.3 MB	Sun May 01 21:56:59 GMT-500 2016
0ca05ea8bd9112f1dd8c2313dc987e50d	Standard	4.8 MB	Sun May 01 22:09:37 GMT-500 2016
0dd27a63109b35cc57ca7b9d84155b331	Standard	5.1 MB	Sun May 01 22:04:52 GMT-500 2016
0e047f9ba346d56343dabfc0e0bab1a59	Standard	5.6 MB	Sun May 01 22:02:09 GMT-500 2016
0e21234d07c9f69e5d36ebf031dd1b92	Standard	4.9 MB	Sun May 01 21:56:56 GMT-500 2016
0ef05d295721e64065e093e4aded2b1b	Standard	5 MB	Sun May 01 22:01:16 GMT-500 2016
108080f239df640376a7011e89913c	Standard	4.9 MB	Sun May 01 21:53:57 GMT-500 2016
110d83c1d3f7643010138b933229f5c5	Standard	5.5 MB	Sun May 01 21:59:29 GMT-500 2016
11688b065c425af851d1e01fa86d7421	Standard	4.5 MB	Sun May 01 21:55:36 GMT-500 2016
1327840f11a4cd9b19fd8c5f381dc7b0	Standard	5 MB	Sun May 01 22:08:50 GMT-500 2016
19628f6fd5d01371laab6f012f1f65dc84	Standard	4.9 MB	Sun May 01 22:01:56 GMT-500 2016
1b3d7df17eba5cf773310091581fb51	Standard	6 MB	Sun May 01 21:51:02 GMT-500 2016
1bd7d299ba53382811fdb119d39eb7	Standard	4.9 MB	Sun May 01 21:51:57 GMT-500 2016
1c30cf13288bc2cb2c2a33502cc148c	Standard	5.3 MB	Sun May 01 22:00:03 GMT-500 2016
1c8ab31c293853d6b39f160b50ec4b8f	Standard	5.3 MB	Sun May 01 21:54:42 GMT-500 2016
1d3743938efc454500a2a33313c90fa5f	Standard	4.8 MB	Sun May 01 21:57:55 GMT-500 2016
1d413ccb6a45f995e20bd2adea235639	Standard	4.9 MB	Sun May 01 22:03:52 GMT-500 2016
1d52922bf9d90dccc0d84072436dfc1c1	Standard	5.2 MB	Sun May 01 22:03:40 GMT-500 2016
200082630192c4b24202f34d35e1239b	Standard	5 MB	Sun May 01 22:09:39 GMT-500 2016
243a0f41997f278c1b0690f249f13ea5	Standard	5.8 MB	Sun May 01 21:55:45 GMT-500 2016
26838a23df0e122ad02cb98638d46382	Standard	6 MB	Sun May 01 21:58:17 GMT-500 2016
26d4887b38755405b1ab5053bd9fa	Standard	4.7 MB	Sun May 01 22:02:28 GMT-500 2016
26ca0b54df816235c98a40f0f0fced2	Standard	5.4 MB	Sun May 01 22:06:19 GMT-500 2016
2b476d6805a7d0b0443c4df4d9751dc8	Standard	5 MB	Sun May 01 21:55:52 GMT-500 2016

Feedback English

19:14 19:14 Highlight All Match Case 1 of 1 match

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16 Workers:

The screenshot shows the AWS Management Console EC2 Management Dashboard. On the left, there's a sidebar with various service icons. The main area displays a table of 16 EC2 instances. The columns include Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS, Public IP, and Key Name. Most instances are labeled 'Worker' and are currently 'running'. One instance, 'worker 16', is shown as 'Initializing'. The table has a header row and several data rows. Below the table, a specific instance ('i-729df7ef') is selected, showing its detailed configuration: Instance ID (i-729df7ef), Instance State (running), Instance type (t2.micro), Private DNS (ip-172-31-61-202.ec2.internal), Private IPs (172.31.61.202), Secondary private IPs (vpc-f6e63249a), VPC ID (vpc-f6e63249a), and Subnet ID (subnet-6ff40c45). The 'Status Checks' tab is active, showing 2/2 checks passed. To the right, detailed information for this instance is provided, including Public DNS (ec2-54-175-20-56.compute-1.amazonaws.com), Public IP (54.175.20.56), and various network and security details.

This screenshot shows multiple terminal windows on a Mac OS X desktop, illustrating a distributed system of 16 workers. The terminals are arranged in a grid and show various curl command outputs. The top-left terminal shows a request to 'www.cloudflare.com'. Other terminals show requests to 'www.planwallpaper.com', 'www.elitedangerous.com', and 'darkpledge.com'. The logs include status codes like 200 OK and 302 Found, along with file sizes and response times. The bottom-left terminal shows a 'curl -v' command with detailed headers and a large JSON response body. The bottom-right terminal shows a 'curl -I' command with detailed HTTP headers. The desktop background features a green and white patterned wallpaper.

SQS Management Console - Mozilla Firefox

Filter by Prefix: Enter Text...

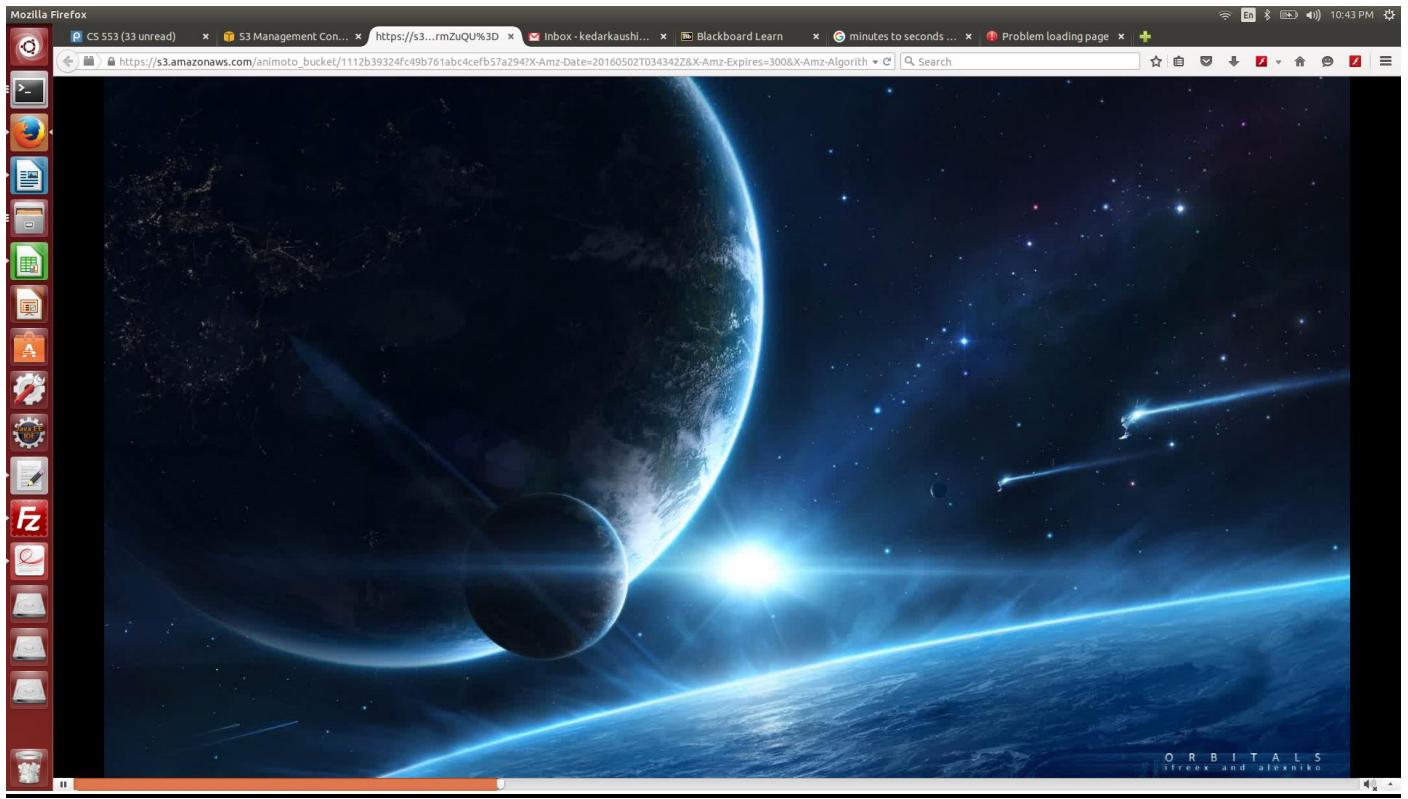
Name	Messages Available	Messages in Flight	Created
MY_QUEUE	0	0	2016-05-01 20:30:26 GMT-05:00
PROCESS_QUEUE	160	0	2016-05-01 22:16:47 GMT-05:00

Feedback English | 19:14 | Highlight All | Match Case | 1 of 1 match | © 2008 - 2016, Amazon Web Services, Inc. or its affiliates. All rights reserved. | Privacy Policy | Terms of Use

S3 Management Console - Mozilla Firefox

Name	Storage Class	Size	Last Modified
06da7dcb...	Standard	5.1 MB	Sun May 01 22:32:17 GMT-500 2016
070151382092...	Standard	5.4 MB	Sun May 01 22:32:24 GMT-500 2016
07ed38c9e685...	Standard	4.8 MB	Sun May 01 22:33:36 GMT-500 2016
0810e99d4...	Standard	6.2 MB	Sun May 01 22:33:36 GMT-500 2016
0b465b1...	Standard	4.6 MB	Sun May 01 22:28:42 GMT-500 2016
0c193860...	Standard	4.9 MB	Sun May 01 22:25:22 GMT-500 2016
0de038d...	Standard	5.5 MB	Sun May 01 22:33:27 GMT-500 2016
1099d4...	Standard	5.1 MB	Sun May 01 22:27:37 GMT-500 2016
1112b3932...	Standard	4.5 MB	Sun May 01 22:35:25 GMT-500 2016
148314...	Standard	5.6 MB	Sun May 01 22:35:27 GMT-500 2016
16133...	Standard	5.4 MB	Sun May 01 22:31:56 GMT-500 2016
1851b...	Standard	5.6 MB	Sun May 01 22:35:32 GMT-500 2016
1963d5...	Standard	5.5 MB	Sun May 01 22:26:02 GMT-500 2016
1a3de...	Standard	6 MB	Sun May 01 22:34:55 GMT-500 2016
1a9bed...	Standard	4.7 MB	Sun May 01 22:32:15 GMT-500 2016
1d33b7...	Standard	5 MB	Sun May 01 22:30:39 GMT-500 2016
1d9c94...	Standard	6 MB	Sun May 01 22:34:46 GMT-500 2016
25280e...	Standard	5.4 MB	Sun May 01 22:34:43 GMT-500 2016
25c3a7...	Standard	5.5 MB	Sun May 01 22:31:16 GMT-500 2016
26c79b...	Standard	4.8 MB	Sun May 01 22:30:41 GMT-500 2016
276bd3...	Standard	5.4 MB	Sun May 01 22:33:44 GMT-500 2016
27f0b...	Standard	5.7 MB	Sun May 01 22:32:44 GMT-500 2016
2b2b05...	Standard	5.1 MB	Sun May 01 22:28:21 GMT-500 2016
2bd418...	Standard	5.2 MB	Sun May 01 22:34:43 GMT-500 2016
2e23455...	Standard	5 MB	Sun May 01 22:26:07 GMT-500 2016
2e3ee1...	Standard	5 MB	Sun May 01 22:30:53 GMT-500 2016
3269c9...	Standard	5.4 MB	Sun May 01 22:35:45 GMT-500 2016
32e8e7...	Standard	5.2 MB	Sun May 01 22:27:57 GMT-500 2016
345b030...	Standard	5.7 MB	Sun May 01 22:27:57 GMT-500 2016
3499966...	Standard	5.5 MB	Sun May 01 22:31:53 GMT-500 2016

Feedback English | 19:14 | Highlight All | Match Case | 1 of 1 match | © 2008 - 2016, Amazon Web Services, Inc. or its affiliates. All rights reserved. | Privacy Policy | Terms of Use



Performance Evaluation :

Throughput :

- For all the experiments performed have been evaluated by measuring their efficiency and throughput.
- The efficient throughput of the system is calculated while considering a statistically provisioned system.
- Throughput is calculated using the above formula

Throughput = Number of Tasks performed

Time Taken to perform the tasks(Seconds)

- The number of tasks per worker are constant, while varying workers to get the throughput at varying number of workers.

Efficiency :

- A dynamic provisioned system is considered while measuring the efficiency of the system.
- Various sleep tasks are performed with varying sleep times like sleep 10ms , 1sec and 10 sec.
- Number of jobs per worker is always kept constant.
- When number of workers are increases , the number of tasks are also increase to keep task per worker constant.
- Efficiency is calculated using the formula,

Efficiency = Ideal Time(sec)

Actual Time (sec)

Local Worker

Throughput

#Threads	#Tasks executed	Time taken (secs)	Throughput (tasks / secs)
1	10000	0.126	79365.07937
2	10000	0.2048	48828.125
4	10000	0.3879	25779.84016
8	10000	0.7768	12873.32647
16	10000	1.577	6341.15409



Since the tasks executed for the experiment is sleep 0 , the throughput for the experiment for 1 worker is very high as it has to perform small duration tasks . Hence the throughput of the system is high for 1 worker.

When the number of workers are increased, the throughput decreases because of the multithreading there is overhead of synchronization and parallel thread running which affects the performance of the overall system.

Efficiency

Task	#Workers	#Tasks performed	Ideal Time (secs) (per worker)	Actual Time (secs) (per worker)	Efficiency (%) (ideal / actual)
Sleep 10ms	1	1000	10	10.1847	98.18649543
Sleep 1	1	100	100	100.12	99.88014383
Sleep 10	1	10	100	100.1	99.9000999
Sleep 10ms	2	2000	10	20.352	98.27044025
Sleep 1	2	200	100	200.241	99.87964503
Sleep 10	2	20	100	200.204	99.89810393
Sleep 10ms	4	4000	10	40.7	98.28009828
Sleep 1	4	400	100	400.484	99.87914623
Sleep 10	4	40	100	400.403	99.8993514
Sleep 10ms	8	8000	10	81.38	98.30425166
Sleep 1	8	800	100	800.971	99.87877214
Sleep 10	8	80	100	800.811	99.89872766
Sleep 10ms	16	16000	10	162.74358	98.31417006
Sleep 1	16	1600	100	1601.956	99.87789927
Sleep 10	16	160	100	1601.629	99.89829105

	1	2	4	8	16
Sleep 10ms	98.1865	98.27044	98.2801	98.30425	98.31417
Sleep 1	99.88014	99.87965	99.87915	99.87877	99.8779
Sleep 10	99.9001	99.8981	99.89935	99.89873	99.89829



The efficiency of the workers is very good in the experiment because of the fact that all the tasks are sleep 0 tasks while the tasks are stored in the system in memory queue. This avoids the communication between amazon api services and all the tasks are accessed from in-memory queue.

Remote Worker

Throughput :

#Workers	#Tasks executed	Time taken (secs)	Throughput (tasks / secs)
1	10000	834.366	11.985148
2	10000	368.13	27.16431695
4	10000	104.134	96.03011504
8	10000	83.08	120.3659124
16	10000	90.817	110.111543



The above graph shows that the throughput increases as the number of workers are increased. Hence we can state that as the workers are increased, we can have better management of jobs by the SQS service.

The throughput of 12 tasks on average per worker is obtained which scales upto 115 tasks per second for 8 workers.

Looking at the graph, we can assume that we get a linear performance but increasing more workers will not increase efficiency & performance. i.e. the speedup will be constant even on increasing the number of workers.

As the number of clients in our experiment is 1, the SQS performance will not improvise even on increasing the worker because, the client count is 1, the efficiency with which the client can allow read the tasks and pass it to the SQS queue will remain same.

Efficiency :

Task	#Workers	#Tasks performed	Ideal Time (secs) (per worker)	Actual Time (secs) (per worker)	Efficiency (%) (ideal / actual)
Sleep 10ms	1	1000	10	25.35657	39.43751067
Sleep 1	1	100	100	110.541	90.46417166
Sleep 10	1	10	100	105.9174	94.41319368
Sleep 10ms	2	2000	10	53.325	18.75293015
Sleep 1	2	200	100	109.6475	91.20134978
Sleep 10	2	20	100	105.9968	94.34247072
Sleep 10ms	4	4000	10	65.55	15.25553013
Sleep 1	4	400	100	109.1844	91.5881756
Sleep 10	4	40	100	111.3814	89.78159729
Sleep 10ms	8	8000	10	71.50292	13.98544283
Sleep 1	8	800	100	113.534	88.07934187
Sleep 10	8	80	100	111.6636	89.55469822
Sleep 10ms	16	16000	10	129.371	7.729707585
Sleep 1	16	1600	100	110.3782	90.59759989
Sleep 10	16	160	100	112.8759	88.59287058

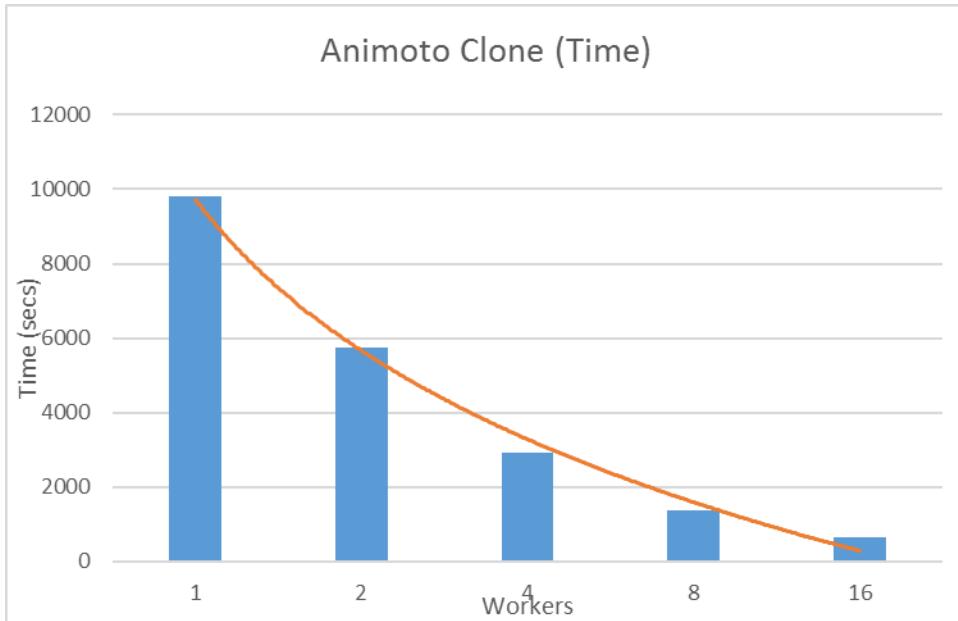
	1	2	4	8	16
Sleep 10ms	39.43751067	18.75293015	15.25553	13.98544	7.729708
Sleep 1	90.46417166	91.20134978	91.58818	88.07934	90.5976
Sleep 10	94.41319368	94.34247072	89.7816	89.5547	88.59287



Animoto Clone :

The running time for this experiment is measured for varying number of workers.

Task	#Workers	Time
160	1	9821.134
160	2	5760.721
160	4	2940.423
160	8	1383.687
160	16	662.537



As per the graph we see the performance decreases linearly with increase in workers. Keeping the tasks (160 Jobs each with 60 images) constant for all the workers, the time taken to complete all the jobs reduces when more number of workers are increased.

The complexity and the processing required to convert the image files into video increases as the number of workers increase because of the synchronization and high computation arising within each worker.

References:

- http://datasys.cs.iit.edu/publications/2014_CCGrid14_CloudKon.pdf
- <http://linuxg.net/how-to-install-ffmpeg-2-6-1-on-ubuntu-15-04-ubuntu-14-10-ubuntu-14-04-and-derivative-systems/>
- <https://forums.aws.amazon.com/thread.jspa?messageID=687571>
- http://www.ffmpeg.org/faq.html#How-do-I-encode-single-pictures-into-movies_003f
- <http://zulko.github.io/blog/2013/09/27/read-and-write-video-frames-in-python-using-ffmpeg/>
- <http://boto3.readthedocs.io/en/latest/guide/sqs.html>