Generating Load from the Cloud Handbook
Version 5.0
English Edition
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Important note: Do not forget to stop all of your Amazon load generators after you have performed the load test. Please read this documentation completely before you start any cloud-based load generator.
## 1 Overview

Starting from Version 4.4-C the Proxy Sniffer Web Load and Stress Testing Tool supports cloud based load test generators. Once you have prepared and verified that your load test works correctly on your local workstation by simulating a small number of web users, you can generate an almost unlimited load from preinstalled load generators located in the Amazon data centers (AWS EC2).

At the time of this writing, Amazon is operating eight data centers located in the following geographies: US West, US East, Ireland, Singapore, Tokyo, Sydney and Sao Paulo. From within the Proxy Sniffer GUI you can seamlessly run your load tests from one or multiple Amazon data centers while monitoring its progress in the Proxy Sniffer GUI, as you would for a locally run test. The Proxy Sniffer GUI makes no distinction between a local cluster of load generators or a cloud based cluster.

Using our cloud-based load generators will give you the following benefits:

- There is no need to purchase or lease any hardware; and no additional installation effort is required. You can save a considerable amount of money if you require powerful load generators for a short time only.

- After following some one-time preparatory steps you can immediately start using the cloud-based load generators, as frequently as you wish. These generators usually start up in less than 3 minutes.

- In situations where your only option would be to perform load tests via a leased line with limited network throughput (such as ADSL), you will not be able to generate realistic load against "Internet Applications". Using the cloud-based load generators is an ideal solution for generating large load tests from your local workstation, especially where only limited bandwidth is available. Amazon has excellent peering relationships with many leading Internet providers allowing you to generate in excess of 500 Mbit/s throughput during a load test.

- This testing methodology allows you to perform end-to-end tests of upstream network components such as DNS servers, routers and firewalls that are traversed in order to reach your web application. This allows you to determine how your web application performs from an end-user's perspective.

- Depending on the licensing model that you are using, you will be able to simulate "from the cloud" up to 200,000 web users (rent per hour) – or even more (Weekly Unlimited License).

- There is no need to configure anything on the load generators. All started load generators are automatically combined to form a load-generating cluster.
2 One-off Setup Tasks

2.1 Register for an Amazon EC2 Account
If you have not already done so, you should register for an Amazon EC2 account. Go to http://aws.amazon.com/ec2/ and click on the “Sign up for Amazon EC2” button. Follow the dialogs (they should be self explanatory). You will also have to enter your credit card information.

2.2 Subscribe to the Amazon Load Generators
This step is only required if you plan to rent the load generator in the Amazon data centers on an hourly base.

If you have purchased a "Weekly Unlimited License" – or a "Weekly Site License" – or a "Weekly Cloud License" – you can skip this step. Do not subscribe to the Amazon load generators in such a case and continue reading chapter 2.3. Note that you have to upload such a license as described in chapter 3.1.1

The subscription for the hourly rented load generators is free and will enable your AWS account to run our AMIs. You will only be charged for the hours that you’ve been using our load generators. Amazon will invoice and charge your credit card on a monthly basis.

No recurring subscription fees or fixed costs apply. If you don’t use our load generators within a calendar month no fees are payable.

You can subscribe to multiple types of load generators depending on the number of licensed virtual users per load generator (5, 100, 200, 500, 1000, 2000, 5000 or 10000 VU).

To subscribe to one or several types of load generators go to http://www.apicasystem.com/loadtesting/apica-proxysniffer/licensing-models/pricelists.aspx or to www.proxy-sniffer.com/ec2-pricing and read the instructions. Then click on the hyperlink for the corresponding Amazon Product Code.
Hint: if you have never used one of our cloud based load generators we recommend that you perform a first test by starting one load generator which supports only 5 web users. This has the advantage that it costs you only 1 USD per hour avoiding you to incur high charges during your learning stages.

We recommend you to subscribe at least to two types of load generators (5 virtual users and another larger type of load generator).
Note: The Amazon "Activation Key" is not needed. There is no need to take note of it.
2.3 Setup your AWS Security Credentials inside Proxy Sniffer

For you to seamlessly control the cloud based load generators via the Proxy Sniffer GUI we recommend to configure your AWS Security Credentials within Proxy Sniffer.

From the Proxy Sniffer Main Menu navigate to:
⇒ Project Navigator ⇒ Exec Agent Network Configuration ⇒ EC2
To get your **AWS Access Key ID** and your **AWS Secret Access Key** you have to open a new Web browser window and login into Amazon AWS at [http://aws.amazon.com/account](http://aws.amazon.com/account)

Alternatively you can also click on the corresponding hyperlink inside the Proxy Sniffer window.
Your Account

**Account Activity**
View current charges and account activity, itemized by service and by usage type. Previous months’ billing statements are also available.

**Usage Reports**
Download usage reports for each service you are subscribed to. Reports can be customized by specifying usage types, timeframe, service operations, and more.

**Security Credentials**
Amazon Web Services uses access identifiers to authenticate requests to AWS and to identify the sender of a request. Three types of identifiers are available: (1) AWS Access Key Identifiers, (2) X.509 Certificates, and (3) Key pairs.

**Personal Information**
View and edit personal contact information, such as address and phone number. Set communication preferences for email subscriptions.

**Payment Method**
View and edit current payment method, as well as add new payment methods.

**Consolidated Billing**
Receive one bill for multiple AWS Accounts, with cost breakdowns for each account. Usage is combined, enabling you to more quickly reach lower-priced volume tiers.

**AWS Identity and Access Management**
Create multiple users and manage the permissions for each of these users within your AWS Account.

**AWS Management Console**
Access and manage AWS Infrastructure Web Services through our web-based, point-and-click, graphical user interface.

**DevPay Activity**
View revenue and costs for your Amazon DevPay products. Manage your Amazon DevPay products.
Security Credentials

Access to applications and services within AWS cloud is secure and protected in multiple ways. Accessing those applications and services requires the use of special credentials that are associated with your account. There are three types of credentials currently offered by AWS. If you know which security credentials you need, simply select one of the links below:

- **Access Credentials**: Your Access Keys, X.509 Certificates, and Key Pairs
- **Sign-In Credentials**: Your E-mail Address, Password, and AWS Multi-Factor Authentication Device
- **Account Identifiers**: Your AWS Account ID and Canonical User ID

If you are not sure which security credentials you should use, the link below will help you identify the credentials you need for the task you want to accomplish:

<i>Find out which AWS Security Credentials you need</i>

Interested in creating multiple users, each with their own security credentials, and managing the permissions of these users within your AWS Account? Check out AWS Identity and Access Management (IAM).

Access Credentials

There are three types of access credentials used to authenticate your requests to AWS services: (a) access keys, (b) X.509 certificates, and (c) key pairs. Each access credential type is explained below.
You can now copy and paste your "AWS Access Key ID" and your "AWS Secret Access Key" into Proxy Sniffer:

**Access Credentials**

There are three types of access credentials used to authenticate your requests to AWS services: (a) access keys, (b) X.509 certificates, and (c) key pairs. Each access credential type is explained below.

**Your Access Keys**

- **Created**: January 5, 2010
- **Access Key ID**: A
- **Secret Access Key**: H
- **Status**: Active

Create a new Access Key

For your protection, you should never share your secret keys. AWS best practices recommend frequent key rotation.

**Sign-In Credentials**

To sign in to AWS web sites and applications, AWS requires your Amazon E-mail Address and Password. If you lose your Amazon E-mail Address or Password, you can contact Amazon Support for assistance.
After that click on the Update button:

Hint: it is also supported to access the Amazon EC2 service via an outbound Proxy Server of your company. Please be aware that Kerberos authentication against your outbound Proxy Server is not supported ("HTTP basic access authentication" only).

Please make sure you do not confuse this with the authentication method(s) used by your load test program.
You can now select an Amazon EC2 region (the geographic location of the Amazon data center). Please read the disclaimer and scroll down to the bottom of the window. After that enable the "I have read the disclaimer" checkbox and click on the Continue button.
All preparations are now completed:

So far your credit card has not been charged.
3 Generating Load from the Cloud

3.1 Starting the Load Generators in the Cloud

Before you start one or several load generators please consider the following facts:

1. **At least one full hour of usage is charged each time when you start a load generator, for each instance that is started. You will always be charged the hourly fee for each hour (or part thereof) of usage.** We don’t recommend frequently stopping and restarting our load test generators to avoid unneeded charges.

   Some examples:
   - Shutting down and restarting a load generator instance 3 times in an hour will cost you as much as if you would left the same instance running for 3 hours.
   - If you start 3 instances concurrently you will be charged for the hourly rate of each of the 3 instances.

2. Do not stop the load generators until you have acquired all of your load test results. **Your test results will be lost if you stop the load generators without acquiring the test results.**

3. **Do not forget to stop all of your Amazon load generators after you have performed the load test!** As mentioned above you will be charged for every hour (or part thereof) our load generators are running. No automatic shutdowns will occur. **It is your responsibility to ensure that all load generators have been correctly terminated.**

Amazon uses the following naming conventions in relation to their cloud-based virtual machines:

- An "**instance**" is a running cloud computer (load generator) for which you are actually charged by the hour (or part thereof)..
- "**launch**" an instance means: "start" a cloud computer (load generator).
- "**terminate**" an instance means: "stop" a cloud computer (load generator). You will not longer be charged for a load generator after you have "terminated" the instance.
- An "**AMI**" (Amazon Machine Image) is a stored disk-image of a cloud computer (load generator).

The Proxy Sniffer product uses the term "**Exec Agent**" which is synonymous to "load generator".
If you have not already done so, select your desired Amazon data center – and wait until the web browser has refreshed its contents (this operation might take some time to complete).

Click on the [i] icon to see which **types of load generators** are available in your selected Amazon data center:
After a few seconds a new Window is shown. You can now click on the corresponding AMI ID to select the type of the load generator you wish to start. The columns "Manifest" and "Licensing Information" contain further information.

For example the Manifest "ProxySniffer-50-K-2000VU-EC2m22xlarge-02.manifest.xml" means that this type of load generator is licensed to simulate 2000 virtual users.

<table>
<thead>
<tr>
<th>AMI ID</th>
<th>Manifest</th>
<th>Licensing Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-unlimitedVU-EC2m24xlarge-02.manifest.xml</td>
<td>Upload of Temporary Site-License required</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-10000VU-EC2m2xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-5000VU-EC2m2xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-2000VU-EC2m22xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-2000VU-EC2m2xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-2000VU-EC2m2xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
<tr>
<td>pic-us-west-2/ProxySniffer-50-K-2000VU-EC2m2xlarge-02.manifest.xml</td>
<td>Can be instantly rented per hour</td>
<td></td>
</tr>
</tbody>
</table>

If you have purchased a "Weekly Unlimited License" – or a "Weekly Site License" – or a "Weekly Cloud License" – you should always select one of the AMI IDs which is labeled with the licensing information "Upload of Temporary Site-License required" or is labeled with "Upload of Unlimited Short Time License required":

- unlimitedVU*: 26 ECUs  EC2 instance type: m2.4xlarge  (Standard Unix-like instances)
- unlimitedVU-win64*: 13 or 26 ECUs  EC2 instance type: m2.2xlarge / m2.4xlarge  (Windows instances: recommended)
You can now select number of load generators to be started (number of launched instances). After that click on the "Launch Instances" button. In the image shown below two load generators are started and each of them is licensed to simulate 100 virtual users.

Note: at this stage you can also select which protocol will be used for communications between the Proxy Sniffer GUI and the load generators. You can choose either the plain TCP/IP protocol (recommended for most cases) or alternatively you can choose the HTTP or the HTTPS protocol.

When using the HTTPS protocol, the network traffic between the GUI and the load generators will be encrypted. However, there is no protection implemented against "man-in-the-middle" attacks.
The instances are now in the "pending" state. You should **repeatedly click every 15 seconds** on the Refresh icon until you see that all launched instances are in the "running" state.
At this stage you should pause for about 3 minutes. The instances are already running, but the boot process of the operating system requires a small extra time to initialize all required services.

After 3 minutes you can close this window and return to the "Exec Agent Network Configuration" menu.
Each load generator is automatically registered two times as an additional "Exec Agent" and a new cluster named "Amazon-Prx-Cluster" is formed.

As a further but optional step, we recommend that you protect the access to the load generators in order that nobody else than you can later view and download your load test data. In particular, if your load tests use Input Files containing usernames and passwords, you should always protect your Exec Agents.
Protecting the Exec Agents:

You can choose any username and password.
If you have rented the load generators on an hourly base, they are now ready to execute load tests.

### 3.1.1 Uploading a Temporary License

If you have purchased a "Weekly Unlimited License" – or a "Weekly Site License" – or a "Weekly Cloud License" you have additionally to **upload** your license to the load generators:

![Image of upload process for temporary license]

---

[Image: Proxy Sniffer V5.0]  
Generating Load from the Cloud Handbook

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3.1.2 Testing the Reachability and the License of a Load Generator

You can test the configuration and connectivity to an Exec Agent by clicking on the icon within the list of Exec Agents (functional “ping” of Exec Agent):

![Image of Exec Agent Network Configuration](https://example.com/image)

Testing Network Connection to Exec Agent: EC2i-d8adb2a7-B

Successful Connected to ec2-46-61-161-248.us-west-1.compute.amazonaws.com

Exec Agent OS Type: Linux 2.6.31-392-e26-1-aws-1ubuntu8.04.1 / Proxy Sniffer V.5.0

Exec Agent OS Time: 14:59:40 (Mon Jan 22 2011)

Exec Agent Local Time: 22 Jan 2011 14:06:37 (EST)

Exec Agent Load Factor: 0.41

Update Load Factor for Exec Agent "EC2i-d8adb2a7-B"?  Yes  No

Ticket ID: 1100

<table>
<thead>
<tr>
<th>Ticket Type: standard license</th>
<th>Accept Remote Job</th>
<th>Max Pro Versions 4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ticket Expire Date: 30 May 2011</td>
<td>Max Pro Versions 4.5</td>
<td>Accept Free Editions: no</td>
</tr>
<tr>
<td>Ticket Start Date: 1 Jan 2011</td>
<td>Max Server Utilization</td>
<td>Max Consolidated Traffic Utilization</td>
</tr>
<tr>
<td>Ticket End Date: 30 May 2011</td>
<td>Max Total Duration (unlimited)</td>
<td>Max Consolidated Traffic Utilization</td>
</tr>
<tr>
<td>Issued For Company: ProxySniffer AG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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3.2 Executing Load Tests from Load Generators in the Cloud

Note: if you have recorded and prepared your load test via an outbound Proxy Server of your company you must re-generate the load test program after having disabled the option “Load Test over HTTP(S) Proxy” as shown in the following screenshot:
You can now start the load test as usual from your local workstation. Please make sure you select the "Amazon-Prx-Cluster" as the load generator.
If a load test uses any Input Files (data files), the files are automatically transmitted (replicated) to all cluster members.

Optionally you can select in the GUI whether you wish to **automatically split the content of an Input File**.

This can be useful, for example, if an Input File contains user accounts (usernames/passwords) but the web application does not allow duplicate logins. If you enable the corresponding option in the GUI the Input File is automatically divided into parts and each cluster member will receive only a part of the Input File.
Cluster Job 2 - Execute Load Test

Cluster Job Status - completed

Test started at 22 Jan 2013 14:26:16 ECT / Planned test duration: 20:00 min

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Passed URL Calls</td>
<td>79,270</td>
</tr>
<tr>
<td>Total Failed URL Calls</td>
<td>962</td>
</tr>
<tr>
<td>HTTP Request Efficiency (%)</td>
<td>80.2</td>
</tr>
<tr>
<td>Average Web Transaction Rate (URL calls/sec)</td>
<td>250.1</td>
</tr>
<tr>
<td>Session Failures / Ignored Errors</td>
<td>0</td>
</tr>
<tr>
<td>Session Time per Loop (ms)</td>
<td>37.0</td>
</tr>
<tr>
<td>Session Time per Loop (sec)</td>
<td>0.11</td>
</tr>
<tr>
<td>Users Waiting For Response, 18 of 100</td>
<td>18 of 100</td>
</tr>
<tr>
<td>TCP Socket Connect Time (ms)</td>
<td>0.00</td>
</tr>
<tr>
<td>Average Network Throughput (MBps)</td>
<td>60.96</td>
</tr>
<tr>
<td>Total Transmitted Bytes</td>
<td>1592057585</td>
</tr>
</tbody>
</table>

Cluster Member | Job id | Status | Web Trans. Rate | Trans. Bytes | Passed Loops | Failed Loops | Passed URL Calls | Failed URL Calls |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ECO-1def07-A</td>
<td>40</td>
<td>completed</td>
<td>82.06</td>
<td>48,680,476</td>
<td>201</td>
<td>0</td>
<td>19,253</td>
<td>50</td>
</tr>
<tr>
<td>ECO-1def07-B</td>
<td>40</td>
<td>completed</td>
<td>82.54</td>
<td>48,680,162</td>
<td>201</td>
<td>7</td>
<td>18,904</td>
<td>740</td>
</tr>
<tr>
<td>ECO-1def07-A</td>
<td>46</td>
<td>completed</td>
<td>82.56</td>
<td>48,680,221</td>
<td>202</td>
<td>5</td>
<td>18,958</td>
<td>542</td>
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<tr>
<td>ECO-1def07-B</td>
<td>45</td>
<td>completed</td>
<td>82.81</td>
<td>50,181,355</td>
<td>204</td>
<td>2</td>
<td>19,004</td>
<td>240</td>
</tr>
<tr>
<td>Total: Amazon-Prx-Cluster</td>
<td>100</td>
<td></td>
<td>250.06</td>
<td>1,982,087,095</td>
<td>200</td>
<td>14</td>
<td>79,270</td>
<td>182</td>
</tr>
</tbody>
</table>

Cluster Job Completed - Require Test Result
The load test result is now transferred from the cloud to your local workstation.
## Analyse Load Tests - Select and Compare Results

### Upload File:
- **File Extension**: *.poxes

### Load Test Details

<table>
<thead>
<tr>
<th>Load Test</th>
<th>Start Date</th>
<th>User</th>
<th>Test Duration</th>
<th>Web Trans.</th>
<th>Sess. Failures</th>
<th>URL Error Rate</th>
<th>Net. Throughput</th>
<th>Annotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CloudTests01</td>
<td>22 Jan 2011 14:24:17</td>
<td>200</td>
<td>5:09 min</td>
<td>247.3 calls/sec</td>
<td>1.7%</td>
<td>0.3%</td>
<td>5044 MB/sec</td>
<td></td>
</tr>
</tbody>
</table>

### Part of Final Load Test Result

**Diagram Type:**
- Load Curves
- Test Result Comparison

*Hint: Execute the same load test program several times with a different number of concurrent users and compare the measured results. Click on the 👀 icon to display details.*
3.3 Monitoring the System Resources of the cloud-based Load Generators

To monitor the system resources of the cloud-based load generators you can click on the hyperlinks which are shown in the column "Host" of the Exec Agent Network Configuration menu:

If you have protected the access to the load generators the Web browser is asking you for the username and for the password which you have configured.

The most important chart is the CPU Usage in Percent. Starting from simulating more than 500 virtual users from one load generator – and depending on your test scenario – the underlying operating system of a single load generator might be overloaded. However, this happens only in rare cases. Normally a single load generator can simulate at least 1000 virtual users.

If the CPU of a load generator is constantly at nearly 100% usage, the measured response times will be invalid because the measuring system itself is overloaded.

The sum of Established TCP Connections + TCP Connections in Time Wait State can reach a value up to 16,000 without that any problem occurring on a load generator. If you run out of free network connections the special error type "Network Error at Client Side" is reported in the charts and statistics of the load test result.
3.4 Verifying the Quality of Peering between the Amazon Data Center and your Stressed Web Application

You should take a look at the measured value **TCP Socket Connect Time** to verify if the quality of peering between the Amazon data center and your stressed Web application is adequate. Normal values are within a range of 20 up to 200 milliseconds.

You can monitor this value in real-time.
3.5 Stopping the Load Generators in the Cloud

You have to navigate again to the EC2 menu form
Main Menu ➔ Project Navigator ➔ Exec Agent Network Configuration ➔ EC2
Select the Amazon data center in which you have started the load generators. If you have started your load generators in several data centers choose only one of them. You can select later the other data centers.
After that you will see the status of all load generators in the selected data center. Enable the checkboxes for all instances which are in the status "running" and click on the Terminate button.
The instances are now changing their state to "shutting-down".
Wait a few seconds and then click on the Refresh icon. The instances are now changing their state to "terminated". Starting from this point in time you will no longer be charged for the load generators.
We strongly recommend that you repeat this procedure by selecting in a round-robin fashion all other Amazon data centers in order to verify that no other load generator is running in any of the Amazon data centers. You must wait until the web browser shows that the window has been refreshed to get valid information about the selected data center.
**Important Note:** in case you are unable to stop (terminate) the Amazon load generators by using the Proxy Sniffer GUI, you must immediately use Amazon's "**AWS Management Console**" at [http://aws.amazon.com/console](http://aws.amazon.com/console) (select EC2) to terminate the instances.
4 Additional Suggestions

If the web application targeted by your test is located inside your company, you should not use the same leased line to the Internet to control the load generators in the Amazon cloud. If your Internet connection becomes overloaded you might no longer be able to control the load generators or to abort the load test. As a consequence all traffic between your company and the Internet may be severely impacted or even completely blocked.

In such situation we therefore strongly recommend that you use a second direct Internet connection to control the load generators in the Amazon's cloud by using plain TCP/IP connections (Exec Agent TCP port 7993). Should you completely lose control of the load generators please login from a secondary Internet connection directly into the Amazon AWS console and shutdown all load generators instances to restore the connectivity.
5 Proxy Sniffer Manufacturer

Ingenieurbüro David Fischer AG, Switzerland  |  A company of the Apica Group

Product Web Site:  http://www.proxy-sniffer.com