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Google App Engine

## Google App Engine



<a href="#">Developer(s)</a>	<a href="#">Google</a>
<b>Initial release</b>	April 7, 2008
<a href="#">Stable release</a>	1.7.5 / 13 February 2013; 18 days ago (2013-02-13)
<b>Development status</b>	Released
<b>Written in</b>	<a href="#">Python</a> , <a href="#">Java</a> , <a href="#">Go</a>
<a href="#">Type</a>	Web development
<b>Website</b>	<i>developers.google.com/appengine/</i>

**Google App Engine** (often referred to as **GAE** or simply **App Engine**, and also used by the acronym **GAE/J**) is a platform as a service (PaaS) [cloud computing](#) platform for developing and hosting [web applications](#) in Google-managed data centers. Applications are [sandboxed](#) and run across multiple servers.<sup>[1]</sup> App Engine offers automatic scaling for web applicationsâ€”as the number of requests increases for an application, App Engine automatically allocates more resources for the web application to handle the additional demand.<sup>[2]</sup>

Google App Engine is free up to a certain level of consumed resources. Fees are charged for additional storage, bandwidth, or instance hours required by the application.<sup>[3]</sup> It was first released as a preview version in April 2008, and came out of preview in September 2011.

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## Supported features/restrictions

### Runtimes and frameworks

Currently, the supported [programming languages](#) are [Python](#), [Java](#) (and, by extension, other JVM languages such as [Groovy](#), [JRuby](#), [Scala](#), [Clojure](#), [Jython](#) and [PHP](#) via a special version of [Quercus](#)), and [Go](#).<sup>[4]</sup> Google has said that it plans to support more languages in the future, and that the Google App Engine has been written to be language independent.<sup>[5]</sup>

Python web frameworks that run on Google App Engine include GAE framework,<sup>[6]</sup> Django, [CherryPy](#), [Pyramid](#), [Flask](#), [web2py](#) and

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webapp2,<sup>[17]</sup> as well as a custom Google-written webapp framework and several others designed specifically for the platform that emerged since the release.<sup>[18]</sup> Any Python framework that supports the [WSGI](#) using the CGI adapter can be used to create an application; the framework can be uploaded with the developed application. Third-party libraries written in pure Python may also be uploaded.<sup>[19][10]</sup>

Google App Engine supports many Java standards and frameworks. Core to this is the [servlet 2.5 technology](#) using the open-source [Jetty Web Server](#).<sup>[11]</sup> along with accompanying technologies such as [JSP](#). [JavaServer Faces](#) operates with some workarounds. Though the datastore used may be unfamiliar to programmers, it is easily accessed and supported with [JPA](#), [JDO](#) and other methods of reading and writing data are also provided. The [Spring Framework](#) works with GAE, however the Spring Security module (if used) requires workarounds. [Apache Struts](#) 1 is supported, and [Struts 2](#) runs with workarounds.<sup>[12]</sup>

The [Django web framework](#) and applications running on it can be used on App Engine with modification. Django-nonrel<sup>[13]</sup> aims to allow Django to work with non-relational databases and the project includes support for App Engine.<sup>[14]</sup>

Applications developed for the [Grails web application framework](#) may be modified and deployed to Google App Engine with very little effort using the App Engine Plugin.<sup>[15]</sup>

## Reliability and Support

All billed High-Replication Datastore App Engine applications have a 99.95% uptime SLA.<sup>[16]</sup>

App Engine is designed in such a way that it can sustain multiple datacenter outages without any downtime. This resilience to downtime is shown by the statistic that the High Replication Datastore saw 0% downtime over a period of a year.<sup>[17]</sup>

Paid support from Google engineers is offered as part of Premier Accounts.<sup>[18]</sup> Free support is offered in the App Engine Groups and [Stack Overflow](#), however assistance by a Google staff member is not guaranteed.

## API List

### Trusted Tester

Monitoring API

### Experimental

Cloud Endpoints

Conversion API (Python, Java) - \*Deprecated\*

Google Cloud Storage API (Python)

Files API (Python, Java, Go)

Full Text Search API

Mapreduce API (Python)

Prospective Search API (Python, Java)

ProtoRPC API (Python)

Task Queue REST API (Python, Java)

[OAuth](#) API (Python, Java, Go)

[OpenID](#) (Python, Java, Go)

App Identity API (Python, Java)

### Production

Blobstore API (Python, Java, Go)

Capabilities API (Python, Java, Go)

Channel API (Python, Java, Go)

Datastore API (Python, Java, Go)

Datastore Async API (Python, Java)

Images API (Python, Java, Go)

Log Service API (Python, Go)

Mail API (Python, Java, Go)

Memcache API (Python, Java, Go)

Multitenancy API (Python, Java)

Remote API (Java)

SSL access on custom domains

Task Queue API (Python, Java, Go)

URLFetch API (Python, Java, Go)

Users API (Python, Java, Go)

[XMPP](#) API (Python, Java, Go)

## Bulk downloading

SDK version 1.2.2 adds support for bulk downloads of data using Python.<sup>[19]</sup> The open source Python projects gaebar,<sup>[20]</sup>

approcket,<sup>[21]</sup> and gawsh<sup>[22]</sup> also allow users to download and backup App Engine data. No method for bulk downloading data from GAE using Java currently exists.

## Restrictions

Developers have read-only access to the filesystem on App Engine. Applications can use only virtual filesystems, like gae-filestore.<sup>[23]</sup>

App Engine can only execute code called from an HTTP request (scheduled background tasks allow for self calling HTTP requests).

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Users may upload arbitrary Python modules, but only if they are pure-Python; [C](#) and Pyrex modules are not supported.

Java applications may only use a subset (The JRE Class White List) of the classes from the JRE standard edition. [\[24\]](#)

Does not support 'naked' domains (without www) like <http://example.com>. The required alias to ghs.google.com is implemented with a DNS CNAME record in order for changes in Google server IP addresses not to impact the service. This record cannot be used with other DNS records (RFC 1034 section 3.6.2, RFC 1912 section 2.4), including the required Start of Authority for the example.com [DNS zone](#). Suggested workaround is to use the domain registrar HTTP redirection to a subdomain, e.g.

"www.example.com". [\[25\]](#)

Datastore cannot use inequality filters on more than one entity property per query. [\[26\]](#)

A process started on the server to answer a request can't last more than 60 seconds (with the 1.4.0 release, this restriction does not apply to background jobs anymore).

Does not support sticky sessions (a.k.a. session affinity), only replicated sessions are supported including limitation of the amount of data being serialized and time for session serialization.

## Major differences

### Differences with other application hosting

Compared to other scalable hosting services such as [Amazon EC2](#), App Engine provides more infrastructure to make it easy to write scalable applications, but can *only* run a limited range of applications designed for that infrastructure.

App Engine's infrastructure removes many of the system administration and development challenges of building applications to scale to hundreds of requests per second and beyond. [\[27\]](#) Google handles deploying code to a cluster, monitoring, failover, and launching application instances as necessary.

While other services let users install and configure nearly any \*NIX compatible software, App Engine requires developers to use only its [supported languages, APIs, and frameworks](#). Current APIs allow storing and retrieving data from a [BigTable](#) non-relational database; making HTTP requests; sending e-mail; manipulating images; and caching. Existing web applications that require a relational database will not run on App Engine without modification.

Per-day and per-minute quotas restrict bandwidth and CPU use, number of requests served, number of concurrent requests, and calls to the various APIs, and individual requests are terminated if they take more than 60 seconds or return more than 32MB of data.

### Differences between SQL and GQL

Google App Engine's datastore has a SQL-like syntax called "GQL". GQL intentionally does not support the [Join](#) statement, because it seems to be inefficient when queries span more than one machine. [\[28\]](#) Instead, one-to-many and many-to-many relationships can be accomplished using ReferenceProperty(). [\[29\]](#) This shared-nothing approach allows disks to fail without the system failing. [\[30\]](#) Switching from a relational database to the Datastore requires a paradigm shift for developers when modelling their data.

Unlike a [relational database](#) the Datastore API is not relational in the SQL sense.

The Java version supports asynchronous non-blocking queries using the Twig Object Datastore [\[31\]](#) interface. This offers an alternative to using threads for parallel data processing.

## Portability concerns

Developers worry that the applications will not be portable from App Engine and fear being locked into the technology. [\[32\]](#) In response, there are a number of projects to create open-source back-ends for the various proprietary/closed APIs of app engine, especially the datastore. Although these projects are at various levels of maturity, none of them are at the point where installing and running an App Engine app is as simple as it is on Google's service. [\[33\]](#) [AppScale](#) and TyphoonAE [\[34\]](#) are two of the open source efforts.

[AppScale](#) can run Python, Java, and Go GAE applications on EC2 and other cloud vendors.

TyphoonAE [\[34\]](#) can run python App Engine applications on any cloud that support linux machines.

[Web2py](#) web framework offers migration between SQL Databases and Google App Engine, however it doesn't support several App Engine-specific features such as transactions and namespaces. [\[35\]](#)

## Backends

In Google I/O 2011, Google announced *App Engine Backends*, which are allowed to run continuously, and consume more memory. [\[36\]](#)[\[37\]](#)

## Google Cloud SQL

In Oct 2011, Google previewed a zero maintenance SQL database, which supports JDBC and DB-API. [\[38\]](#) This service allows you to create, configure, and use relational databases with App Engine applications. The database engine is MySQL Version 5.1.59 and the database size must be no larger than 10GB. [\[39\]](#)

## Usage quotas

Google App Engine requires a Google account to get started, and an account may allow the developer to register up to 10 applications. This limit can be increased by Google staff.

Google App Engine defines usage quotas for free applications. Extensions to these quotas can be requested, and application authors can pay for additional resources. [\[40\]](#) Below are limit and quotas defined per application:

### Hard limits

Quota	Limit
-------	-------

#### Medan -- Sumatera Utara :

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Time per request	60 sec per normal request, 10 minutes for tasks, unlimited for backends
HTTP response size	32 MB
Datastore item size	1 MB

## Free quotas

Application creators who enable billing pay only for instance hours, bandwidth, storage, and API usage in excess of the free quotas. Free quotas were reduced on May 25, 2009,<sup>[41]</sup> reduced again on June 22, 2009,<sup>[41]</sup> but then revised in May 2011 to allow for more infrastructure and pricing changes.<sup>[42][43]</sup>

	Quota	Limit (per day)
Instance-hours		28 hours
Emails		100 (5000 admin emails)
Bandwidth in		Unlimited
Bandwidth out		1 GB
Datastore		1 GB
Datastore Operations		50k
<a href="#">Blob</a> Storage		5 GB
<a href="#">XMPP</a> API		10k stanzas
Channel API		100 channels opened
Conversion API		100 conversions
URLFetch API calls per day		657,000

## Competition

[Amazon Web Services](#)

[Engine Yard](#)

[Heroku](#)

[Force.com](#)

[Skytap](#)

[VMware](#)

[Rackspace Cloud](#)

[GoGrid](#)

[Windows Azure](#)

[OpenShift](#)

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<sup>^</sup> <sup>[1]</sup> [dead link](#)

<sup>^</sup> Google I/O 2011: App Engine Backends on [YouTube](#)

<sup>^</sup> Backends Python API Overview

<sup>^</sup> Google Cloud SQL: your database in the cloud

<sup>^</sup> Google Cloud SQL: Sample Application

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## External links

Official website

GAE framework - stack of applications to work with Google App Engine written on [Python](#)

Google App Engine - Run your web applications on Google's infrastructure- a technical talk by Google engineer [Guido van Rossum](#) at [Stanford University](#). *(online video archive)*

Java Frameworks and libraries supported

Web2py book -- online documentation -- Google App Engine deployment recipe

Google Cloud SQL Sample Projects

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Other directors John Doerr [John L. Hennessy](#) Ann Mather Paul Otellini Ram Shriram  
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