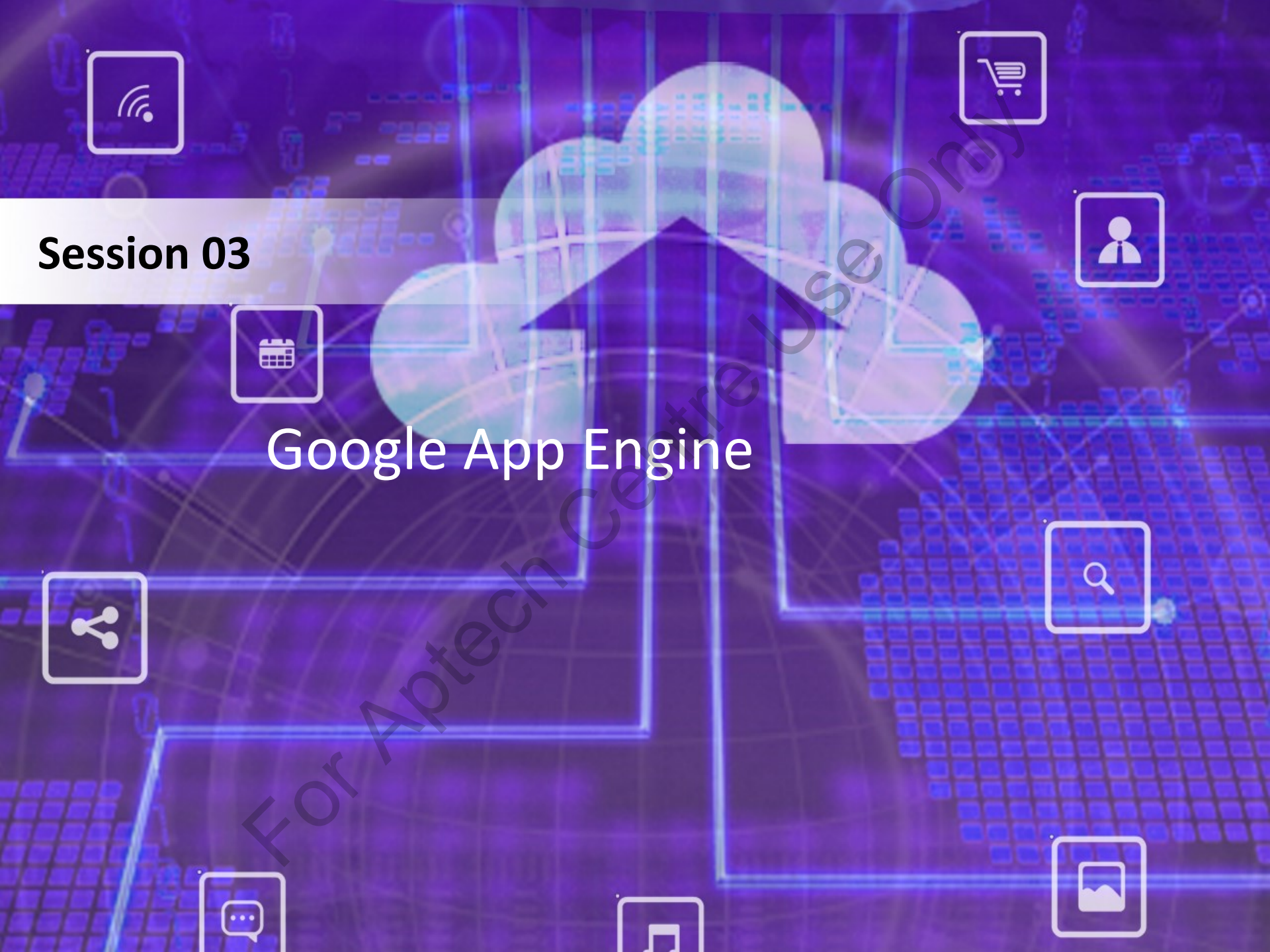


Session 03

Google App Engine

Objectives

- Describe the Google App Engine cloud environment
- Describe the various features of Google App Engine
- Explain the development and deployment in Google App Engine
- Explain the different types of storage services provided in Google App Engine
- List and describe the different types of API services offered by Google App Engine

Introduction

Google provides a distributed and scalable cloud computing environment called Google App Engine.

Google App Engine, also referred to as App Engine, is a platform that allows you to develop Web applications that are hosted on Google infrastructure.

The Google infrastructure provides necessary software to build and maintain the Web applications and scales millions of users' requests and data storage requirements.

The users can simply upload the ready-to-run Web applications to Google-managed servers that make applications accessible to outside world in a very short time.

Google App Engine platform combines building, testing, and maintaining of applications in a highly scalable cloud computing environment.

Features of Google App Engine 1-2

Google App Engine supports various languages, such as Java, Python, PHP, and Go to develop Web applications.

Each language has a runtime and a SDK containing tools that can be used to develop and deploy an application, and test it locally.

Google App Engine manages components of the Web application lifecycle such as request logs, application status check, and application version updating, and so on.

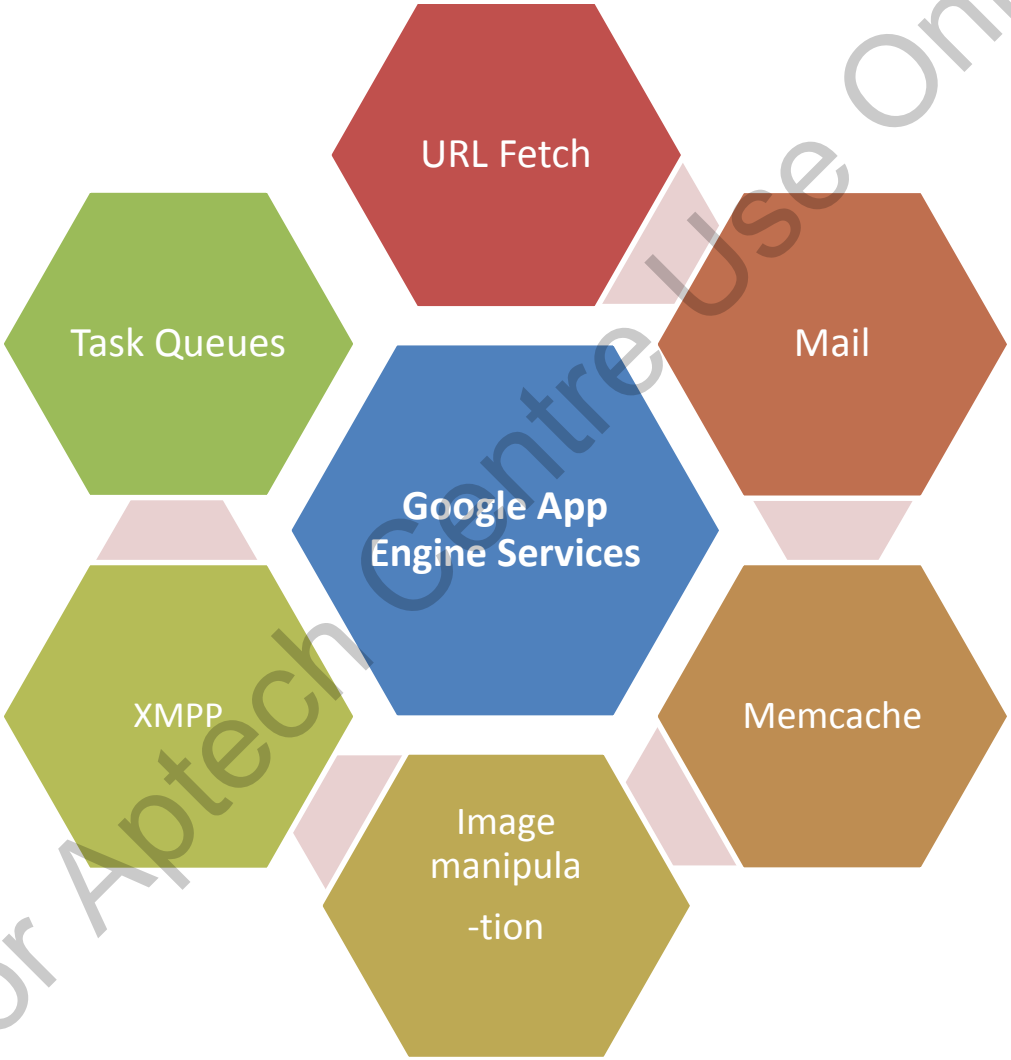
Google App Engine makes it easy to build Web applications that are robust and reliable, even under heavy load and with large amounts of data.

Google App Engine supports common Web technologies that can be used for building dynamic Web applications.

Google App Engine provides APIs for authenticating users and sending e-mail using Google accounts.

Google App Engine provides a development environment that facilities the development and testing of Web applications on local machines. Google App Engine provides a secure environment referred to as Sandbox.

Features of Google App Engine 2-2



Google App Engine Quota

Google App Engine is a PaaS service that offers App Engines APIs as well as hosting services for the applications.

The users do not have to maintain any physical servers at their location, instead Google App Engine offers 1 GB of free data storage for the users.

Google App Engine offers three kinds of quotas that are as follows:

Free Quota

- It is set to provide a certain amount of free limit for deploying applications on the Google App Engine.

Billable Limits

- They are set by administrator and is applied for paid applications. Once set, the applications cannot exceed the limit.

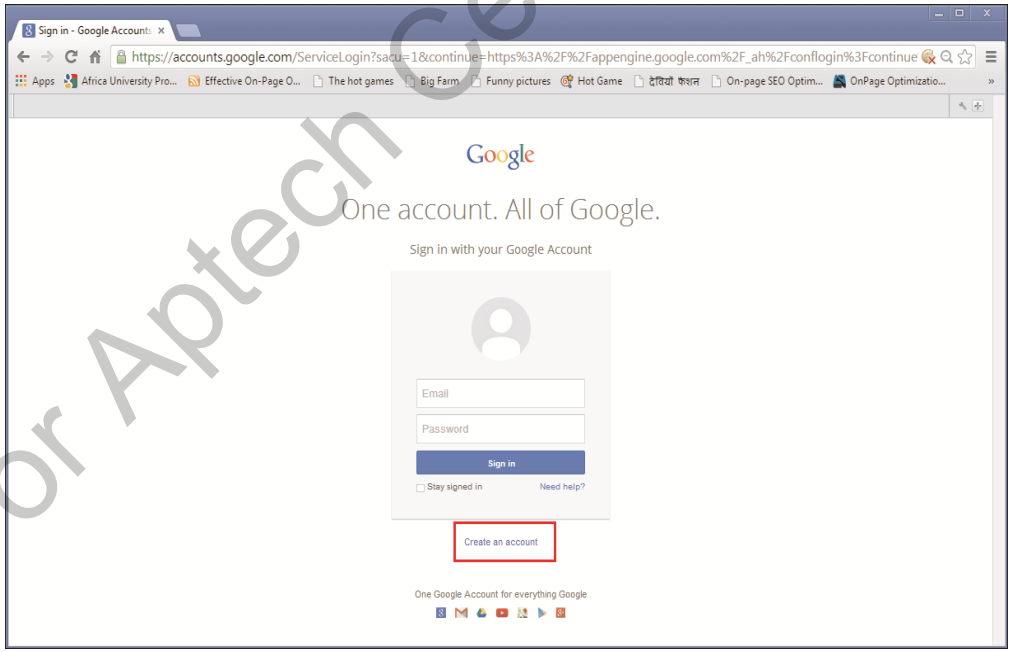
Safety Limits

- They ensure that a single application cannot consume resources alone, leaving other applications starving for resources.

Signing Up for Google App Engine 1-6

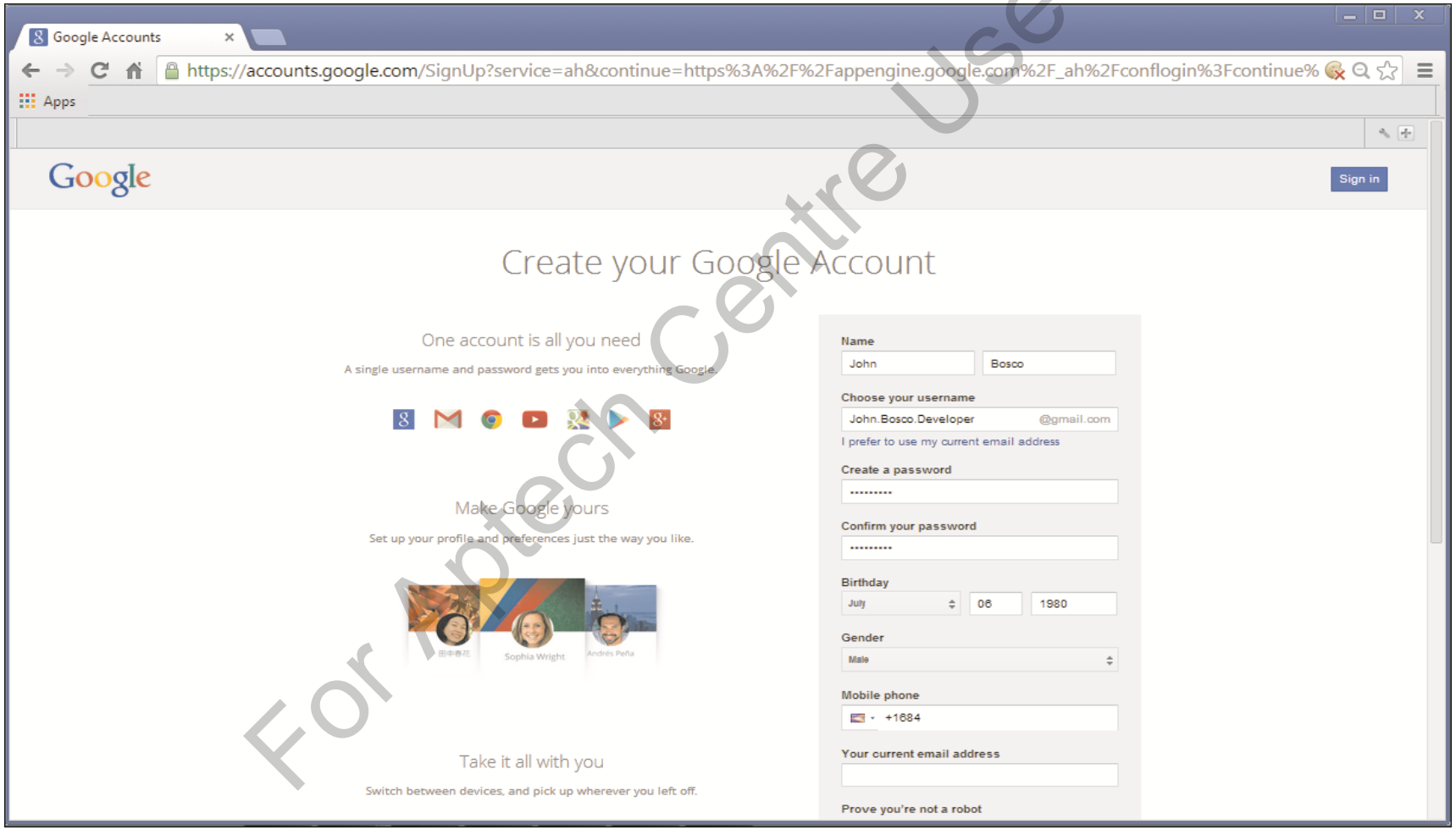
To create an application and deploy it on Google App Engine, you need a Google App Engine account.
The steps to create a new Google account are as follows:

1. Type the address **`http://appengine.google.com`** to open the Google account page.
2. Click **Create an account** link to create a new Google account. Figure shows the Google account page.



Signing Up for Google App Engine 2-6

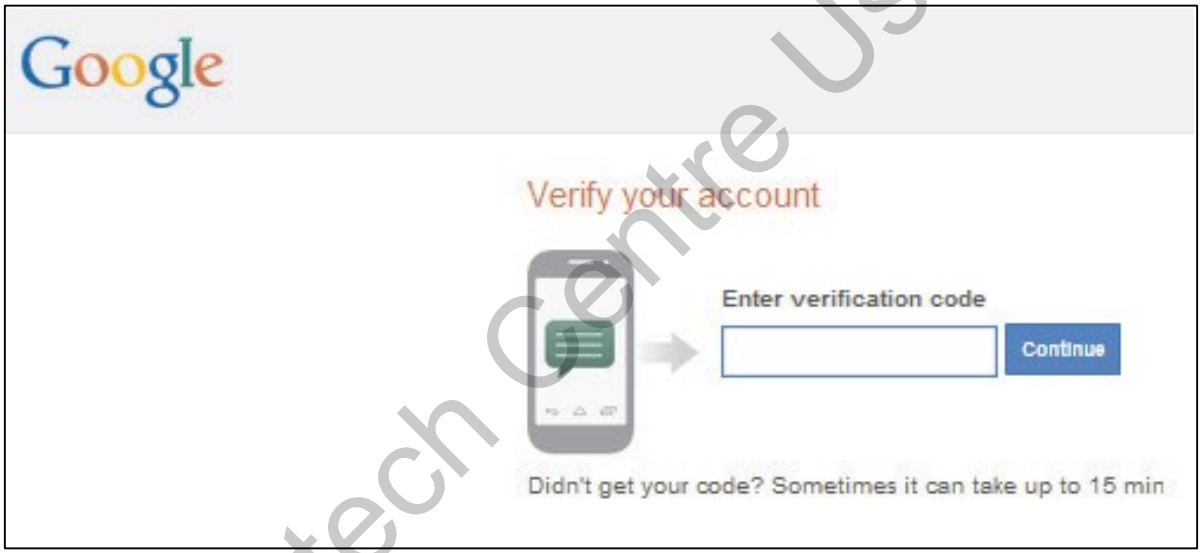
After the link is clicked, figure shows the registration page to sign up a new account.



Signing Up for Google App Engine 3-6

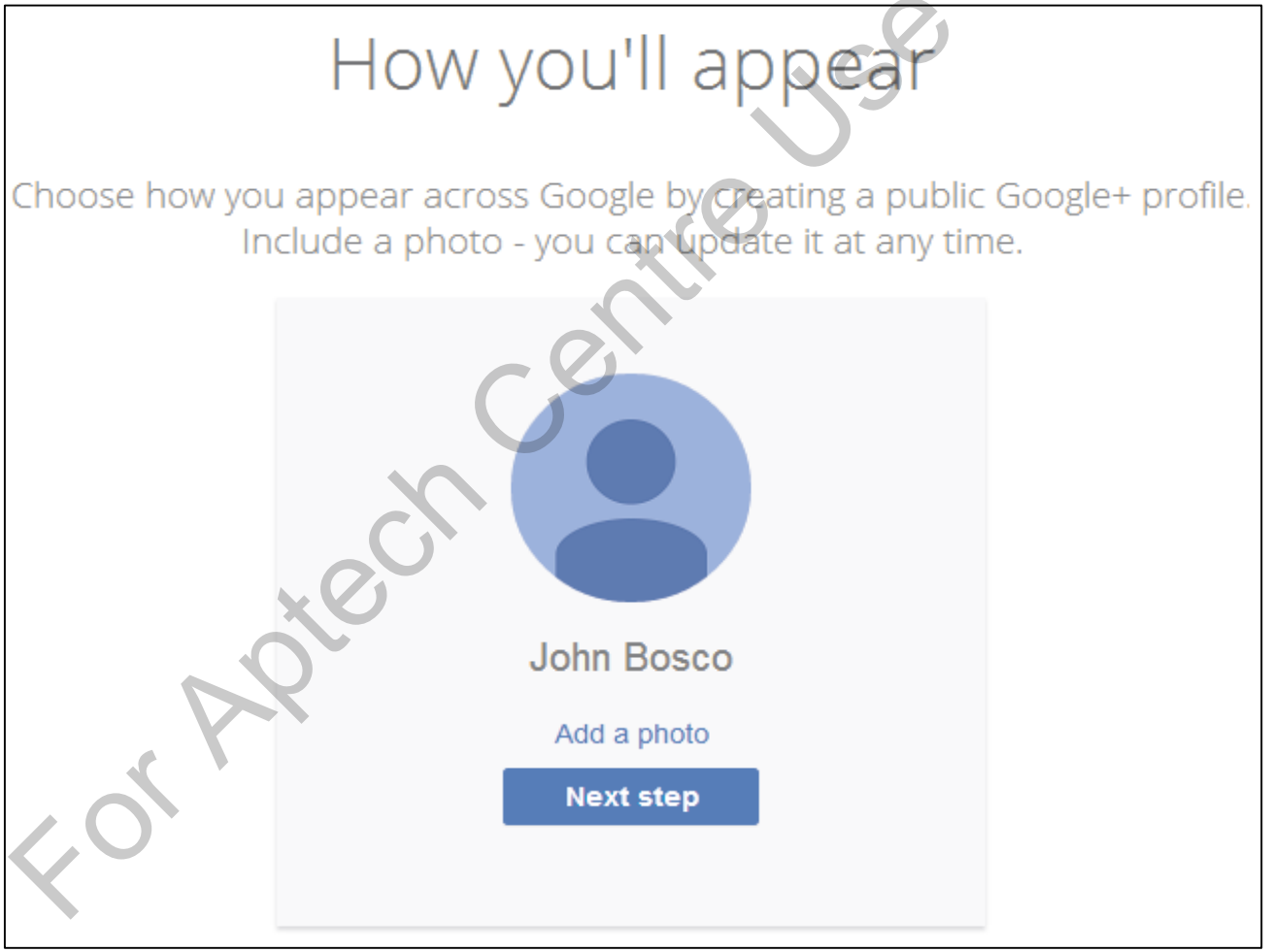
3. Specify the details, accept the terms and conditions, and click **Next Step**.

4. Enter the verification code and click **Continue**.



Signing Up for Google App Engine 4-6

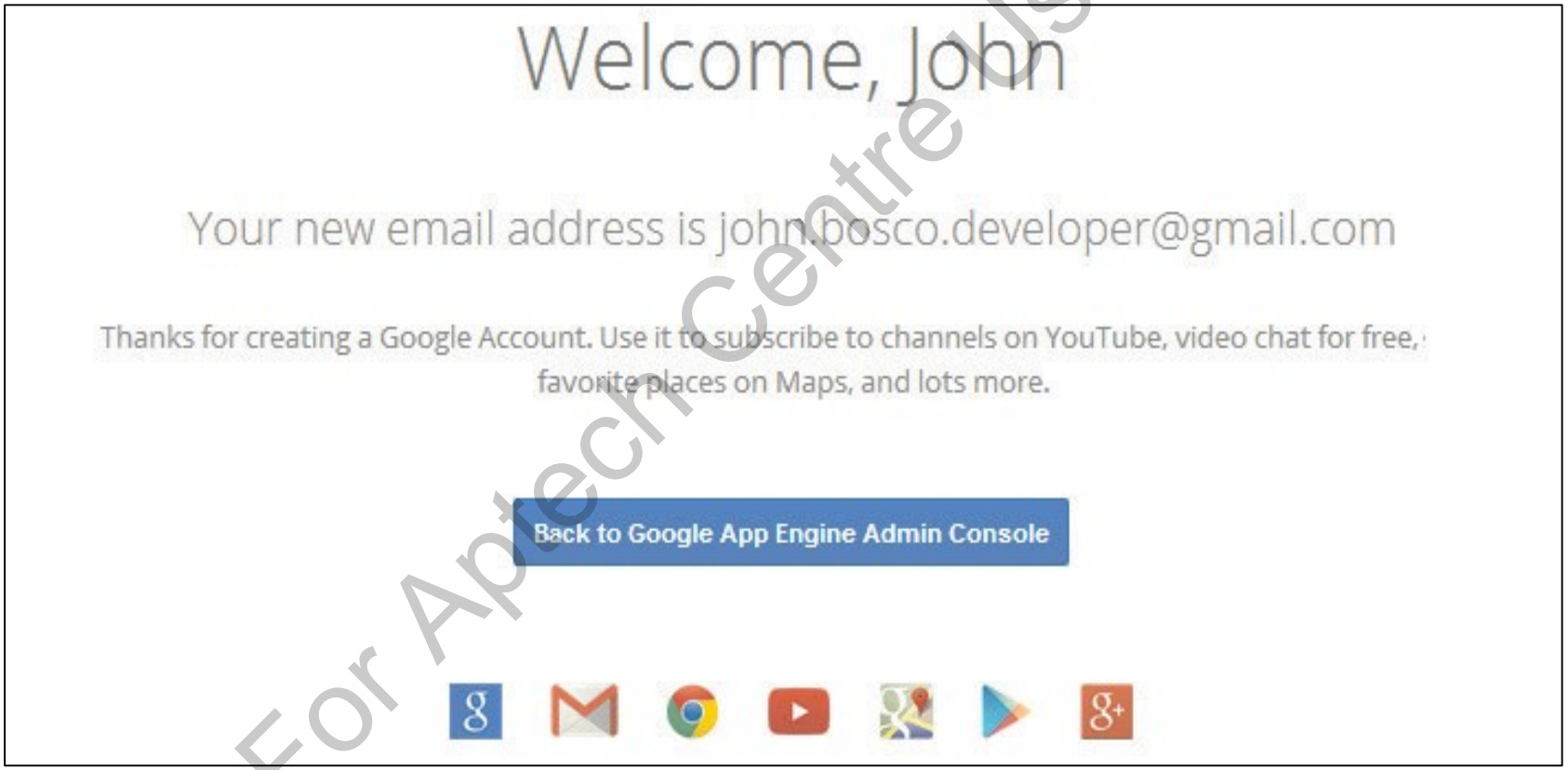
The next page informs users how the user name will appear on login page. Figure shows the user profile.



Signing Up for Google App Engine 5-6

5. Click **Next step** to finish creating the Google account.

Figure displays the Google account creation page with e-mail address.



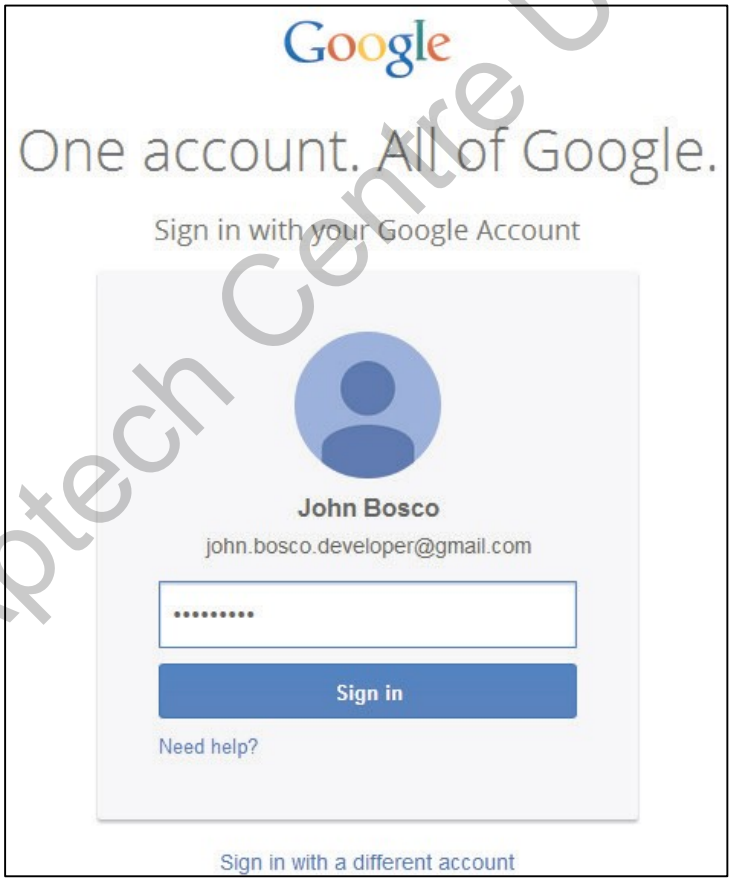
Signing Up for Google App Engine 6-6

6. Click **Back to Google App Engine Admin Console** to display the Google App Engine start page as shown in figure.

Signing Up for Google App Engine-Creating and Registering an Application 1-6

The steps to create and register the first application are as follows:

1. Type **`http://appengine.google.com`** to login with your Google account credentials. Figure displays the Sign in page for Google account.



Signing Up for Google App Engine-Creating and Registering an Application 2-6

2. Specify the login credentials and click **Sign in**.

This will display the Google App Engine start page as shown in figure.

Signing Up for Google App Engine-Creating and Registering an Application 3-6

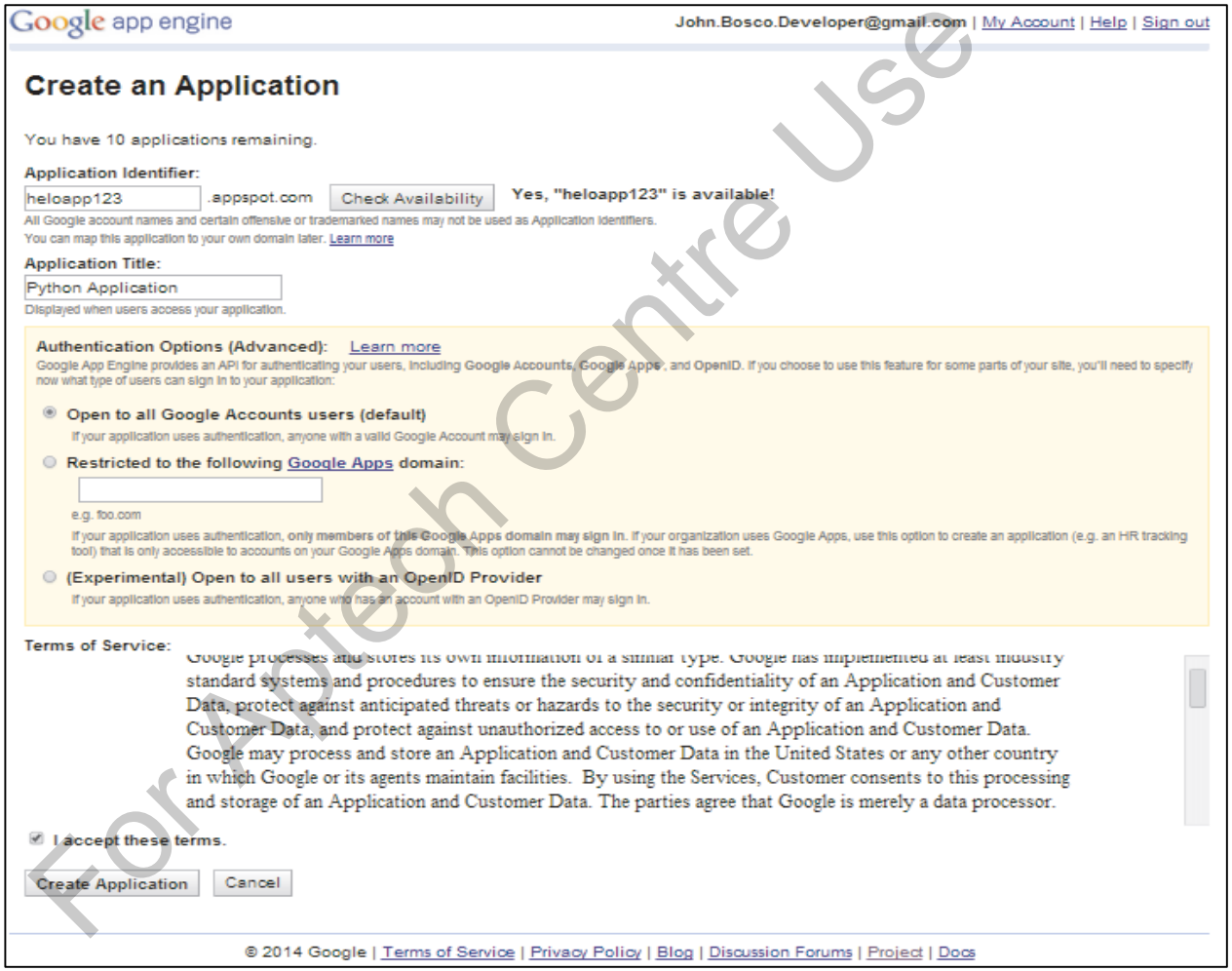
3. Click **Create Application**. This will display **Create an Application** Web page as shown in figure.

Signing Up for Google App Engine-Creating and Registering an Application 4-6

4. Type your-app-id in the **Application Identifier** box. The application ID is a unique name given to the application on the domain **appspot.com**. Here, **appspot.com** is the free domain on which your application is identified with unique identifier. The full URL of the application will be `http://your-app-id.appspot.com`.
5. Click **Check Availability** to check if the application ID is valid.
6. Type `your-app-title` in the **Application Title** box. This serves as a title for the application.

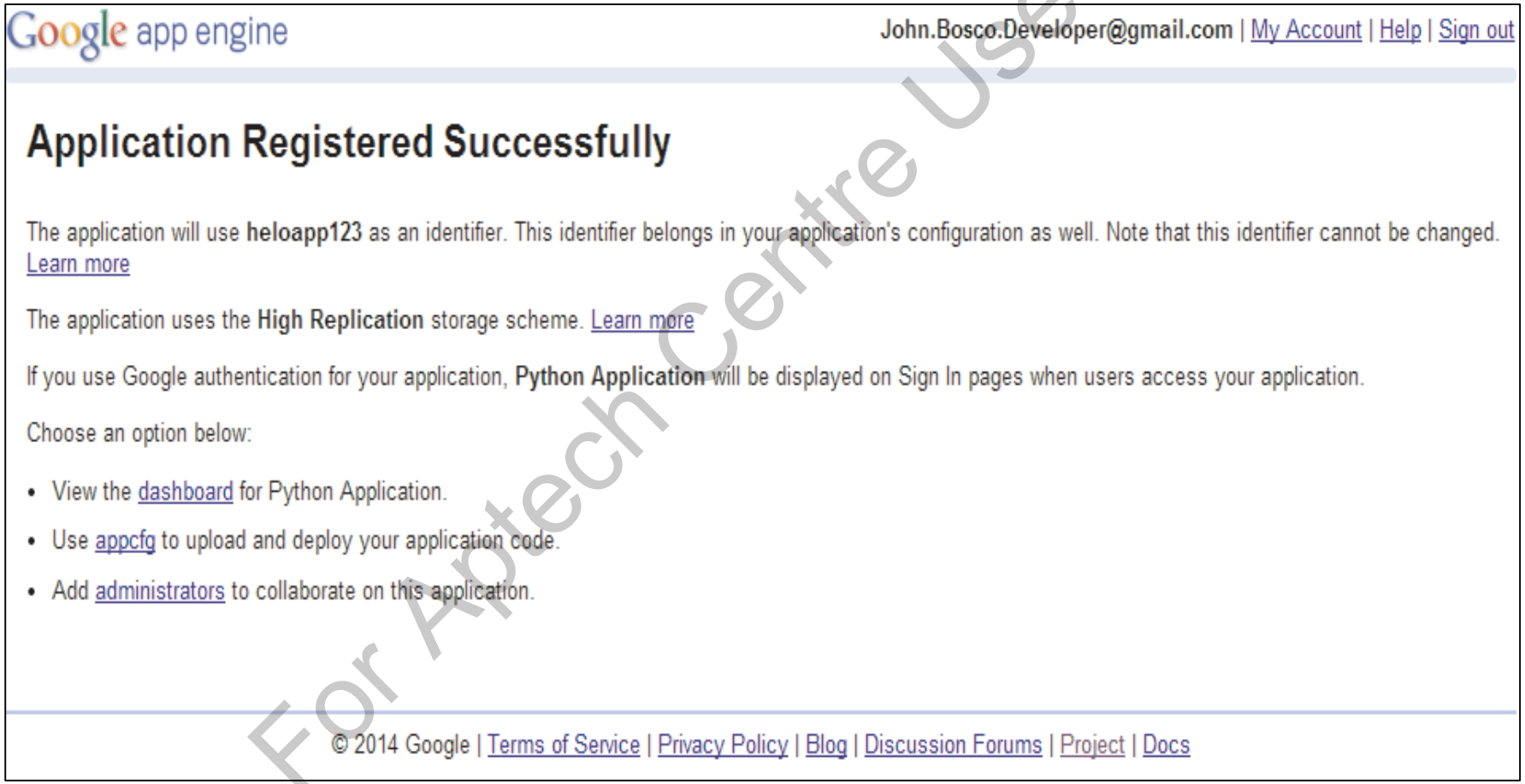
Signing Up for Google App Engine-Creating and Registering an Application 5-6

7. Click **I accept these terms** check box to accept the terms and conditions as shown in figure.



Signing Up for Google App Engine-Creating and Registering an Application 6-6

8. Click **Create Application** to create a new application. The **Application Registered Successfully** Web page is displayed as shown in figure.



Google App Engine Development Environments

Google App Engine platform supports different programming languages such as Java, Python, PHP, and Go for application development.

Each language provides a Software Development Kit (SDK) and a runtime environment that includes:

- Application Programming Interfaces (APIs) classes to build an application.
- Deployment tools to upload the developed application to the Google cloud environment.
- Simulated Google App Engine sandbox environment that provides a full featured development environment on your local system.

Google App Engine Development Environments- Developing Web Application with Python 1-5

Python is a high-level object-oriented programming language. Its syntax helps the programmers to develop complex code easily as compared to other languages such as C or Java.

A pre-loaded Python interpreter on the Google App Engine is used to execute the application in a secured sandbox environment.

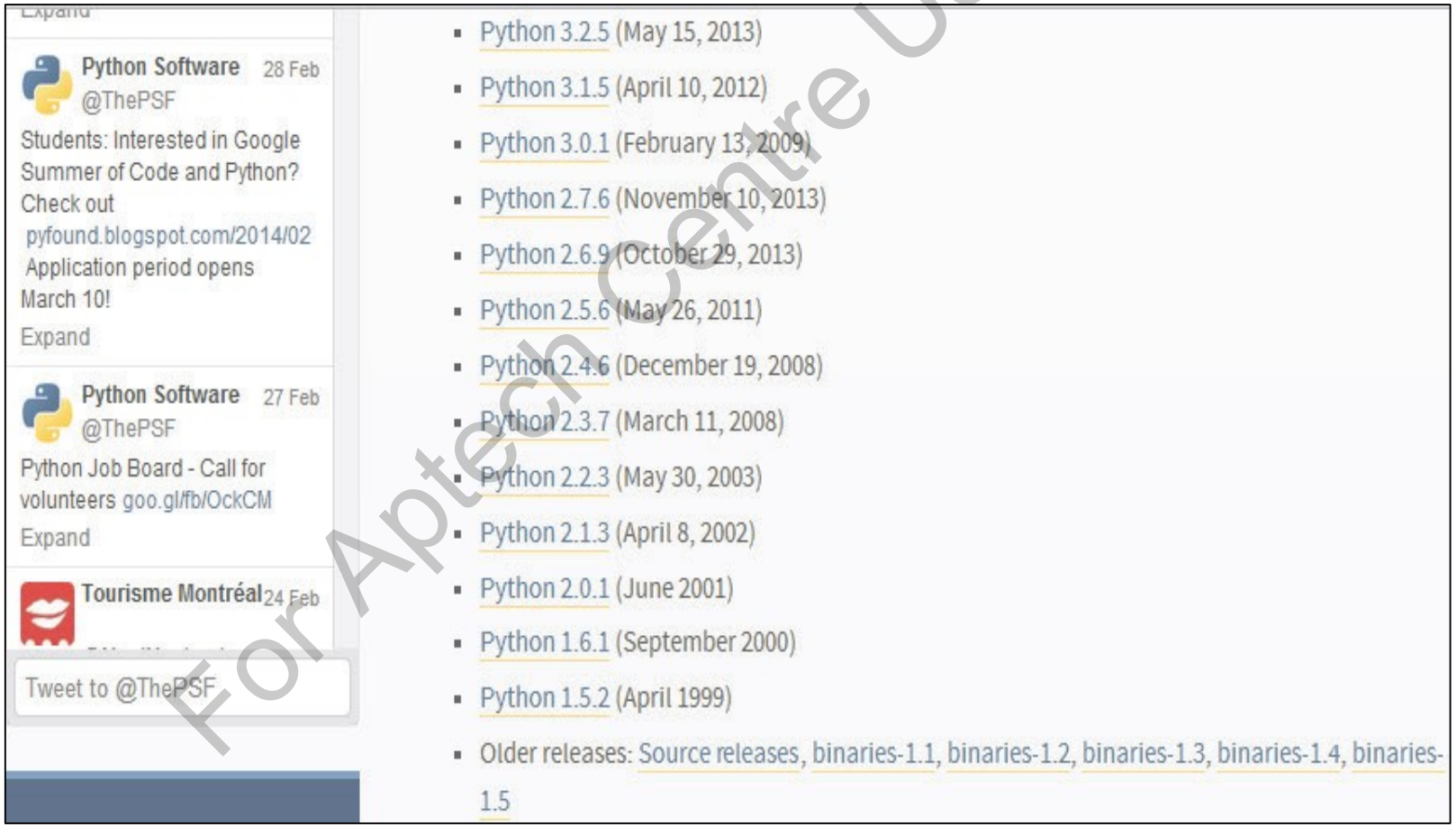
The application interacts with the environment and performs activities such as receiving Web requests, sending responses, and so on.

The Python SDK includes a Google App Engine Launcher that runs on the local machine and provides a graphical interface that simplifies the application development.

Google App Engine Development Environments- Developing Web Application with Python 2-5

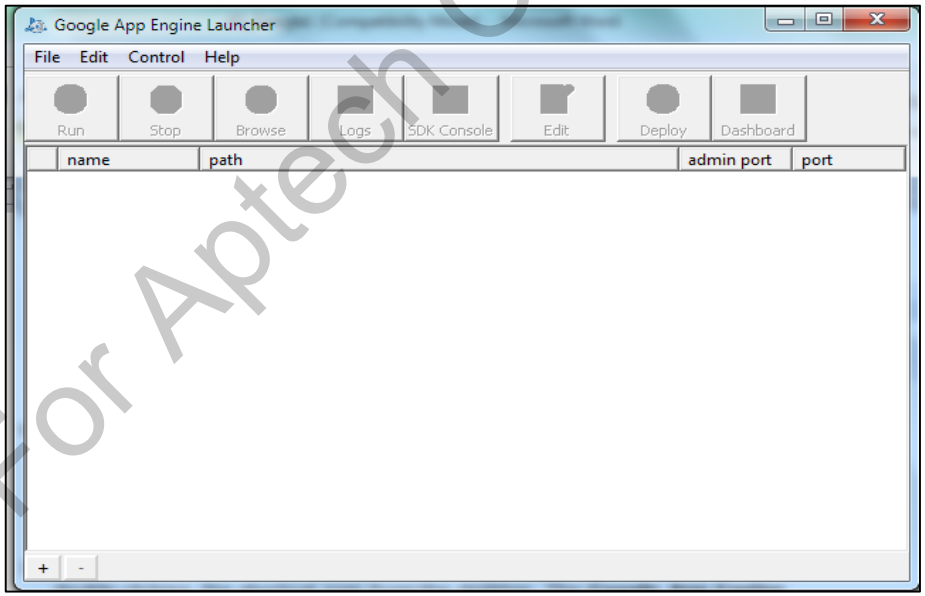
The steps to create an application on Google App Engine using Python are as follows:

1. Download and install the latest version of Python from the Web site, **`http://www.python.org/download/releases/`** as shown in figure.



Google App Engine Development Environments- Developing Web Application with Python 3-5

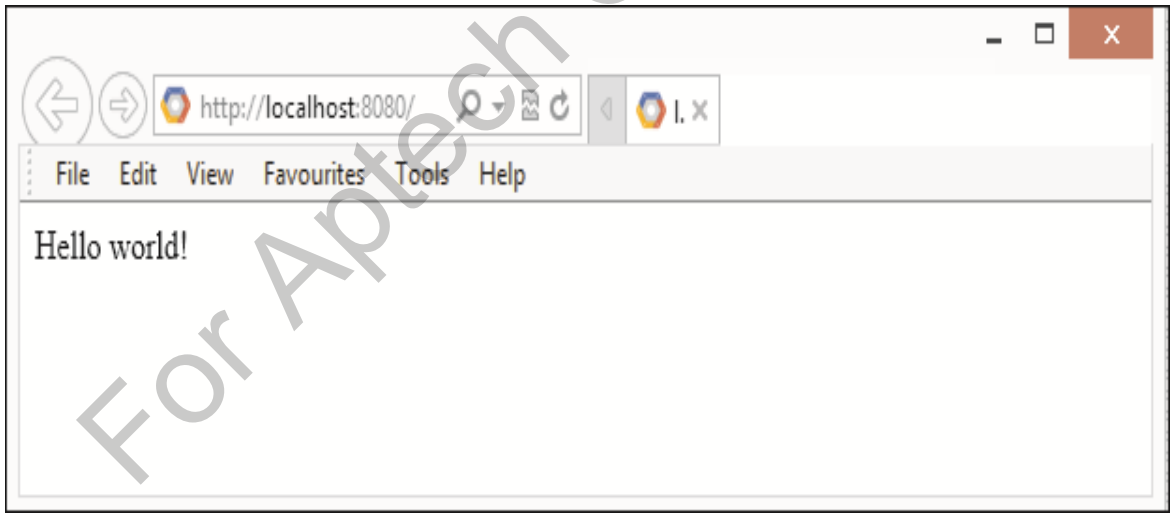
2. Download Google App Engine launcher from **`https://developers.google.com/appengine/downloads#Google_App_Engine_SDK_for_Python`** for the respective platform. For example, **`GoogleAppEngine-1.9.0.msi`**.
3. Install the **`GoogleAppEngine-1.9.0.msi`** on your local system.
4. Launch the **Google App Engine Launcher** as shown in figure.



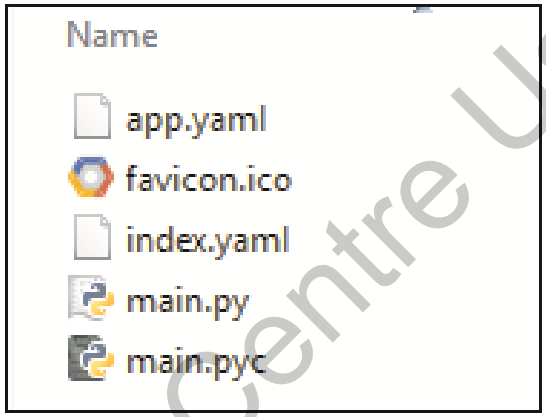
Google App Engine Development Environments- Developing Web Application with Python 4-5

5. Click **File** → **Create New Application**.
6. Type **robbapp1234** in the **Application Name**.
7. Click **Create** to create the Web application.
8. Click **Run** on the Toolbar to start the application. Then, click **Browse** to open the Web browser and view the generated output of the application.

Following figure shows the output of the Python application.



9. Click **Edit → Open in Explorer** to view the structure of the application created in the directory specified during application creation as shown in figure.



Following figure shows the contents of the `app.yml` file.

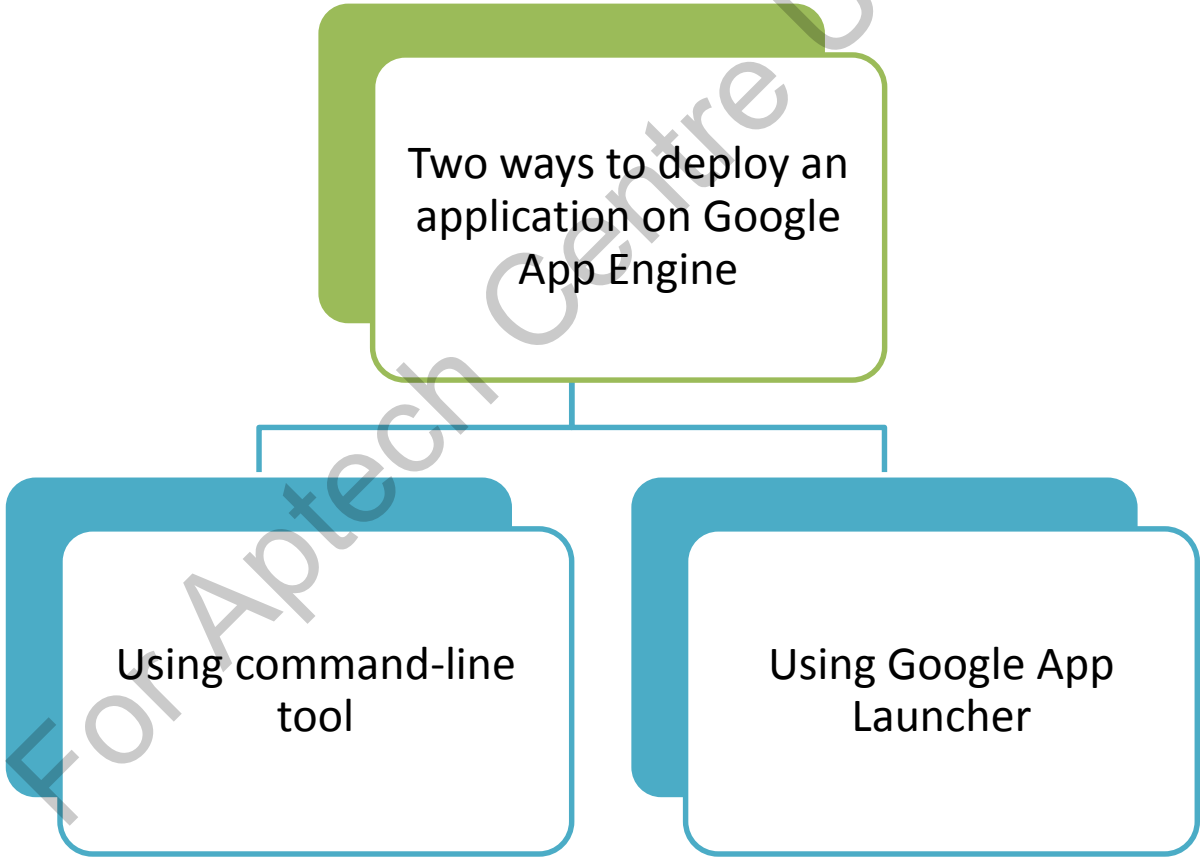
```
application: robbapp1234
version: 1
runtime: python27
api_version: 1
threadsafe: yes

handlers:
- url: /favicon\.ico
  static_files: favicon.ico
  upload: favicon\.ico

- url: .*
  script: main.app

libraries:
- name: webapp2
  version: "2.5.2"
```

Google App Engine Development Environments- Developing Web Applications with Java

- The Web applications can be built using standard Java technologies, such as Servlet and JSP for uploading on Google App Engine.
- The Google App Engine provide Java SDK, which contains JVM and a Web server for testing Java applications.
- Java Virtual Machine (JVM) is used to run the Java applications in a secure sandbox environment similar to the Python.
- The JVM is capable of executing any Java bytecode that operates within the restrictions of the sandbox.
- The Eclipse Integrated Development Environment (IDE) can be used to develop, execute, and upload Java applications on Google App Engine.

Deploying an Application to Google App Engine 1-3

The Web application created on local system can be deployed on Google App Engine. The Google App Engine provides Administration Console, which manages the application running on its server.



Deploying an Application to Google App Engine 2-3

- Before an application is deployed on Google App Engine, you need to register the application with a unique application ID. Once the application is registered, open the app.yml configuration file and change the application: setting from your-app-id to the registered application ID.
- For example, the Web application named **robbapp1234** created in Python can be changed to **heloapp123** application ID registered on the Google App Engine.

- **Using command-line**

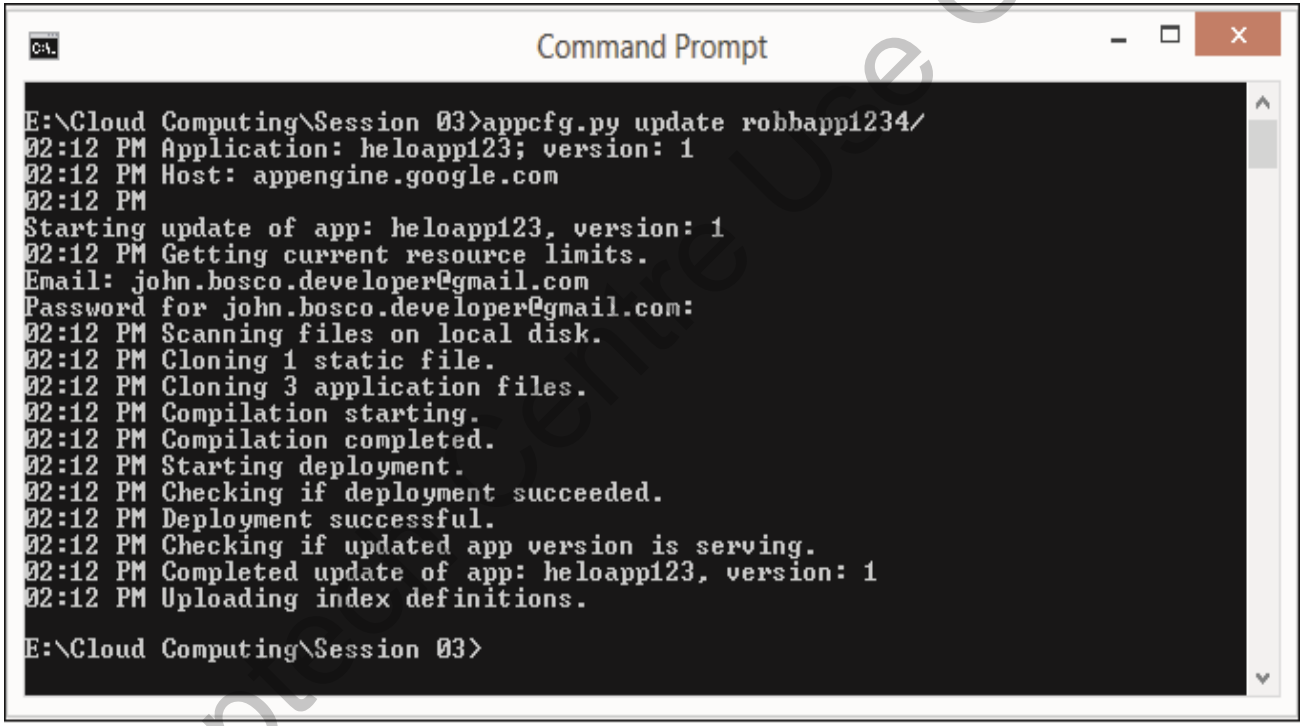
  The `appcfg.py` command is used to upload the ready application on Google App Engine. In order to deploy an application, type the following command in the command prompt:

```
your-sdk-install-dir-path/appcfg.py update your-app-dir
```

For example, `appcfg.py update robbapp123/`. The `appcfg.py` refers to `app.yaml` file to get the application ID registered on the Google App Engine. It prompts the user for Google account credentials and after successful signing in, deploys the application on Google App Engine. The **robbapp123** is the root directory, which contains the `app.yaml` file.

Deploying an Application to Google App Engine 3-3

Figure shows the command prompt to deploy **heloapp123** application using appcfg.py command.



- **Using Google App Engine Launcher**

  Click **Deploy** in the Google App Engine Launcher to deploy the application. It will prompt for Google account username and password to sign in, before application is deployed to Google App Engine.

Google App Engine Storage

Storing data for a Web application is very important because a user interacts with multiple Web servers, which in turn, interact with data storage accessible across multiple machines.

Google App Engine provides an effective solution to this.

The infrastructure of Google App Engine takes care of the distribution, replication, and balancing the data load.

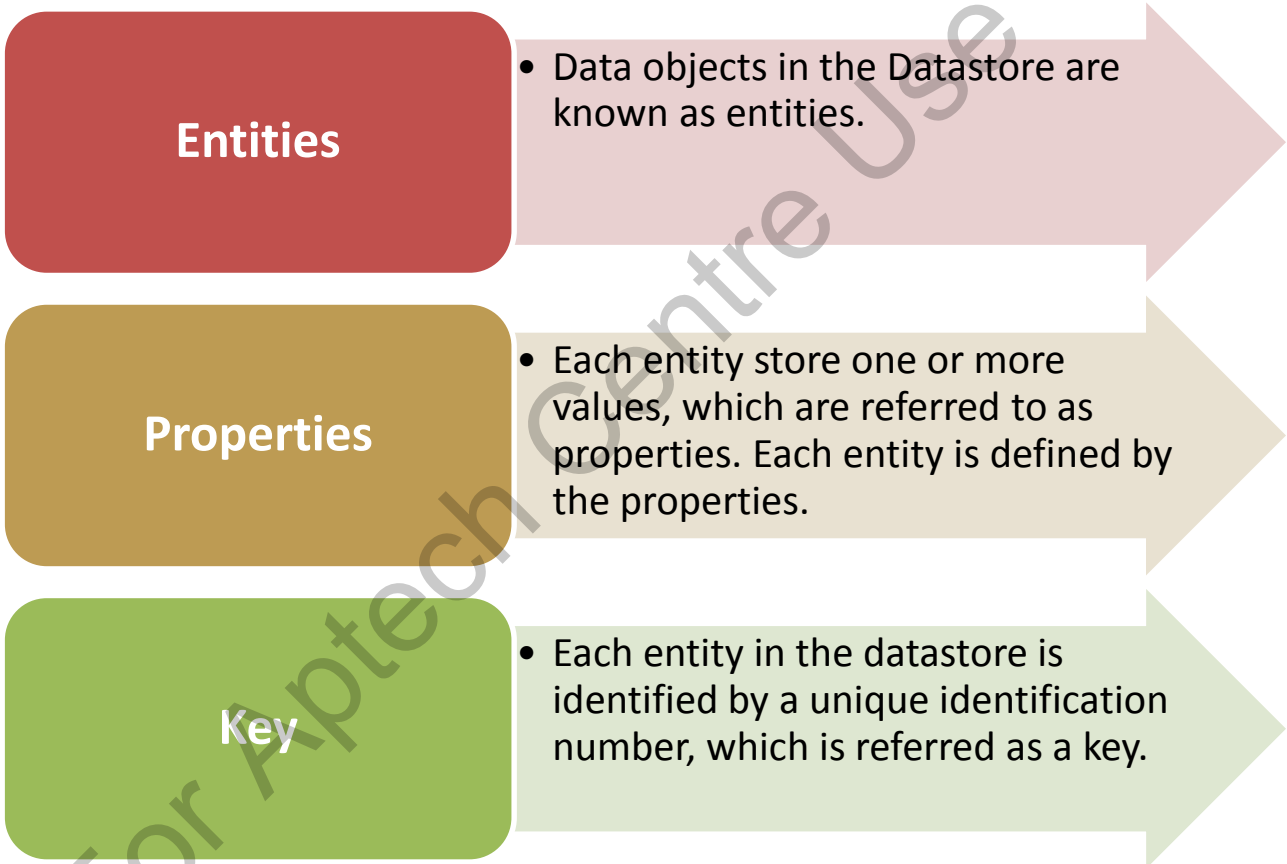
Google App Engine Storage-App Engine Datastore 1-2

App Engine Datastore is a schemaless object datastore that provides scalable storage for the Web applications. Some of the features of App Engine Datastore are as follows:

- It is highly reliable with less downtime.
- It has transaction properties termed as Atomicity Consistency Integrity Durability (ACID).
- It provides high availability for reads and writes.
- It provides strong consistency for reads and ancestor queries are maintained.
- It provides automatic caching of queries.

Google App Engine Storage-App Engine Datastore 2-2

Some of the terms related to objects stored by App Engine Datastore are as follows:



Google App Engine Storage-Google Cloud SQL 1-2

Google Cloud SQL is a service that facilitates creation, configuration, and use of relational databases present in Google's cloud.

It provides MySQL relational database, which is a fully-managed service available on Google’s cloud for your Web applications written in Java, Python, PHP, and Go.

The Google Cloud SQL comes with MySQL client and administrative tools such as reporting tool to work with MySQL database.

It also facilitates easy movement of data, applications, and services in and out of the cloud.

With Google Cloud SQL, users can choose a billing option that fits their usage pattern. The **pay *per* use** billing option facilitates payment only for the time the user has accessed it.

Google App Engine Storage-Google Cloud SQL 2-2

The features of Google Cloud SQL are as follows:

Easy to Use	• It has a graphical user interface, which allows the user to create, configure, manage, and monitor the database instances.
Fully Managed	• It has in-built services for patch management, replication, or backups.
Flexible Configuration	• The instances can be changed with a few seconds of downtime.
Exceptional Security	• Security is a design component of each of Google's cloud computing elements.

Google App Engine Services

Google App Engine provides several services through APIs that are described as follows:

Memcache Service	• The memcache service enables your applications to easily access temporary and frequently used data by using an in-memory cache.
Image Service	• The image service enables applications to manipulate images easily. Developers can resize, crop, and modify images in several other ways using the image service APIs.
URL Fetch Service	• The URL fetch service enables applications to access resources on the Internet, such as Web services or other data.
Mail Service	• The mail service allows applications to send e-mail using the Google infrastructure.

Summary

- Google provides a distributed and scalable cloud computing environment called Google App Engine for developing applications and hosting them at Google data centers.
- The Google App Engine supports various programming languages to develop Web applications for Google App Engine. The primary languages supported are Python and Java.
- Google App Engine provides a secure environment referred to as Sandbox.
- Google App Engine offers three kinds of quotas that are namely, Free Quota, Billable Limits, and Safety Limits.
- A user can sign in through Google account to create and register your Web applications on Google App Engine.
- Datastore and Google Cloud SQL are few data storage services provided by Google App Engine.
- Memcache, Image, URL Fetch, and Mail are few API services supported by Google App Engine.