



# Process and Service Programming

## 5.2 Mail

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I.E.S.  
Doctor Balmis

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## 5.2 Mail

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### 5.2.1 Jakarta Mail

When scouring the Internet for tutorials on sending emails using Java, there is a high chance every single one will mention something called `Jakarta Mail` or `Java Mail`.

For a long time, the Java Enterprise Edition (commonly known as Java EE), has been the de facto platform for developing mission-critical applications.

Recently, in order to stir the creation of cloud-native applications, several prominent software vendors joined hands to transfer Java EE technologies to the Eclipse Foundation, which is a not-for-profit organization tasked with stewarding the activities of the Eclipse open source software community.

Consequently, the Java EE has been rebranded to Jakarta EE.

In spite of the name change, all the main classes and properties definitions still remain the same for both Jakarta Mail and JavaMail.



#### Jakarta vs Java Mail

To avoid confusion, it's important to note that JavaMail is only the former name of Jakarta Mail and the two represent the same software.

So, Jakarta Mail, or JavaMail as some still like to call it, is an API for sending and receiving emails via **SMTP**, **POP3**, as well as **IMAP** and is the most popular option that also supports both TLS and SSL authentication. It is platform-independent, protocol-independent, and built into the Jakarta EE platform.

You can also find Jakarta Mail as an optional package for use with the Java SE platform.

## Library usage

To start working with Jakarta Mail, first, you should add the `jakarta.mail.jar` file into your CLASSPATH environment. You can download the file from the [Jakarta Mail Project \(https://eclipse-ee4j.github.io/mail/#Download\\_Jakarta\\_Mail\\_Release\)](https://eclipse-ee4j.github.io/mail/#Download_Jakarta_Mail_Release) page on GitHub.

You can also find the `jakarta.mail.jar` file in the Maven repository and add it to your environment with `Maven` dependencies:

```
1  <dependencies>
2    <dependency>
3      <groupId>com.sun.mail</groupId>
4      <artifactId>jakarta.mail</artifactId>
5      <version>2.0.1</version>
6    </dependency>
7  </dependencies>
```

sh

### package names

Within the code in some tutorials, you might see `javax.mail` instead of `jakarta.mail`. This shouldn't worry you, as it's just the API reference used in dependencies representing the older version of Jakarta Mail.

## 5.2.2 Jakarta Mail API Core Classes

The Jakarta Mail API has a wide range of classes and interfaces that can be used for sending, reading, and performing other actions with email messages—just like in a typical mailing system.

Although there are several packages in the Jakarta Mail Project, two of the most frequently used ones are `jakarta.mail` and `jakarta.mail.internet`.

The `jakarta.mail` package provides classes that model a mail system and the `jakarta.mail.internet` package provides classes that are focused to Internet mail systems.

Here is a description of the core classes in each of the packages:

### `jakarta.mail.Session`

The Session class, which is not subclassed, is the *top-level class of the Jakarta Mail API*. It's a multi-threaded object that acts as the connection factory for the Jakarta Mail API. apart from collecting the mail API's properties and defaults, **it is responsible for configuration settings and authentication**.

To get the Session object, you can call either of the following two methods:

- `getDefaultInstance()`, which returns the default session
- `getInstance()`, which returns a new session

### `jakarta.mail.Message`

The `Message` class is an *abstract class* that models an email message; its subclasses support the actual implementations. Usually, its `MimeMessage` subclass (`jakarta.mail.internet.MimeMessage`) is used for actually crafting the details of the email message to be sent. A `MimeMessage` is an email message that uses the MIME (Multipurpose Internet Mail Extension) formatting style defined in the RFC822.

Here are some of the commonly used methods of the `MimeMessage` class:

Method	Description
<code>setFrom(Address addresses)</code>	It's used to set the "From" header field.
<code>setRecipients(Message.RecipientType type, String addresses)</code>	It's used to set the stated recipient type to the provided addresses. The possible defined address types are "TO" ( <code>Message.RecipientType.TO</code> ), "CC" ( <code>Message.RecipientType.CC</code> ), and "BCC" ( <code>Message.RecipientType.BCC</code> ).
<code>setSubject(String subject)</code>	It's used to set the email's subject header field.
<code>setText(String text)</code>	It's used to set the provided String as the email's content, using MIME type of "text/plain".
<code>setContent(Object message, String contentType)</code>	It's used to set the email's content, and can be used with a MIME type other than "text/html".

## jakarta.mail.Address

The `Address` class is an *abstract class* that models the addresses (To and From addresses) in an email message; its subclasses support the actual implementations. Usually, its `InternetAddress` subclass, which denotes an Internet email address, is commonly used.

## jakarta.mail.Authenticator

The `Authenticator` class is an *abstract class* that is used to get authentication to access the mail server resources—often by requiring the user's information. Usually, its `PasswordAuthentication` subclass is commonly used.

## jakarta.mail.Transport

The `Transport` class is an *abstract class* that uses the `SMTP` protocol for submitting and transporting email messages.

### 5.2.3 Send basic emails in Jakarta Mail

Essentially, here are the steps for sending an email message using the Jakarta Mail API:

1. Configure the SMTP server details using a **Java Properties object**. You can get SMTP server details from your email service provider.
2. Create a Session object by calling the `getInstance()` method. Then, pass the `account's username and password` to `PasswordAuthentication`. When creating the session object, you should always register the `Authenticator` with the Session.
3. Once the Session object is created, the next step is to create the email message to be sent. To do this, start by passing the created session object in the `MimeMessage` class constructor.
4. Next, after creating the message object, set the From, To, and Subject fields for the email message.
5. Use the `setText()` method to set the content of the email message.
6. Use the `Transport` object to send the email message.
7. Add Exceptions to retrieve the details of any possible errors when sending the message.

## Preparing session

The very first step is to get the mail session object. The Session class is a singleton class. So you can't directly create an instance of it. You need to call one of the overloaded static methods, usually `getInstance()`.

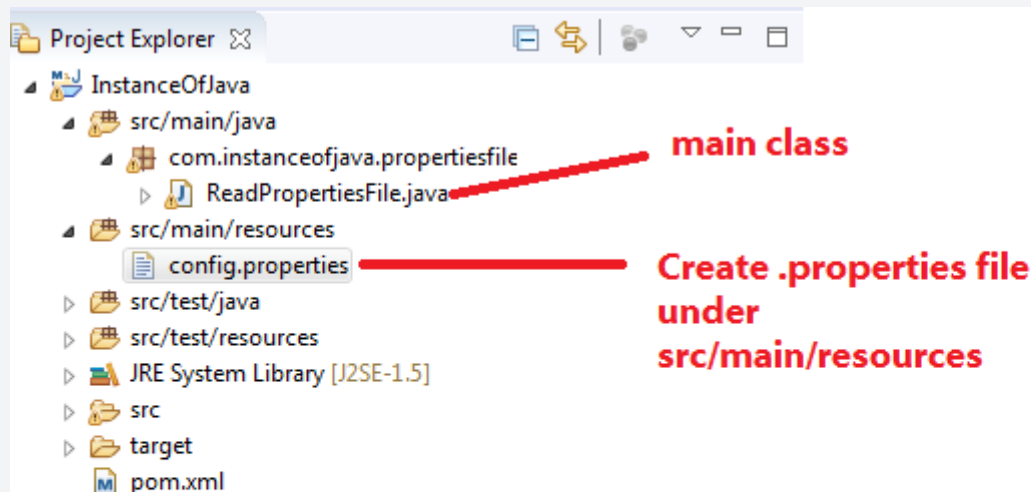
### Properties Files/Objects

A property file is a text file containing key-value pairs for the configuration settings of a project.

It can be created on-the-fly as in the next examples, but it can also be read from a file in the project (this is the preferred way).

Here you can find some links to take a look on how to use and access these files

- [Java Properties Files y como usarlos - Arquitectura Java](https://www.arquitecturajava.com/java-properties-files-y-como-usarlos/) (<https://www.arquitecturajava.com/java-properties-files-y-como-usarlos/>)
- [Getting started with Java properties - Baeldung](https://www.baeldung.com/java-properties) (<https://www.baeldung.com/java-properties>)
- [Properties class in Java - javaTpoint](https://www.javatpoint.com/properties-class-in-java) (<https://www.javatpoint.com/properties-class-in-java>)



**Note:** If you create maven project using eclipse folder structure will be created by default

**[www.InstanceOfjava.com](http://www.InstanceOfjava.com)**

In the previous image you can see where to place the properties file in a `Maven` project.

```

1 // Prepare SMTP configuration into a Property object
2 final Properties prop = new Properties();
3 prop.put("mail.smtp.username", "usuario@gmail.com");
4 prop.put("mail.smtp.password", "passwordEmail");
5 prop.put("mail.smtp.host", "smtp.gmail.com");
6 prop.put("mail.smtp.port", "587");
7 prop.put("mail.smtp.auth", "true");
8 prop.put("mail.smtp.starttls.enable", "true"); // TLS
9
10 // Create the Session with the user credentials

```

java

```

11 Session mailSession = Session.getInstance(prop, new jakarta.mail.Authenticator() {
12     @Override
13     protected PasswordAuthentication getPasswordAuthentication() {
14         return new PasswordAuthentication(prop.getProperty("mail.smtp.username"),
15             prop.getProperty("mail.smtp.password"));
16     }
17 });

```

In the above code, we have just created the Session object with properties and the Authenticator object.

The properties are as follows.

- mail.smtp.username – Username of SMTP server
- mail.smtp.password – Password of SMTP server
- mail.smtp.host – Host of SMTP server
- mail.smtp.port – Port
- mail.smtp.auth – Is Authentication is required.
- mail.smtp.starttls.enable – TLS enable or not.

The Authenticator is an abstract class. Its object is created by providing an anonymous implementation of getPasswordAuthentication() method. The PasswordAuthentication class is used as a placeholder for storing user credentials.

## Message composition (plain text)

Next, we will compose the email message. The jakarta.mail.Message class represents a message in Java mail API. Since it's an abstract class, we will use its concrete implementation `jakarta.mail.internet.MimeMessage` class. Java Mail API allows sending mail either in plain text or in HTML content. Let's start by sending a plain text message.

```

1 // Prepare the MimeMessage
2 Message message = new MimeMessage(mailSession);
3 // Set From and subject email properties
4 message.setFrom(new InternetAddress("no-reply@gmail.com"));
5 message.setSubject("Sending Mail with pure Java Mail API ");
6
7 // Set to, cc & bcc recipients
8 InternetAddress[] toEmailAddresses =
9     InternetAddress.parse("user1@gmail.com, user2@gmail.com");
10 InternetAddress[] ccEmailAddresses =
11     InternetAddress.parse("user21@gmail.com, user22@gmail.com");
12 InternetAddress[] bccEmailAddresses =
13     InternetAddress.parse("user31@gmail.com");
14
15 message.setRecipients(Message.RecipientType.TO, toEmailAddresses);
16 message.setRecipients(Message.RecipientType.CC, ccEmailAddresses);
17 message.setRecipients(Message.RecipientType.BCC, bccEmailAddresses);
18
19 /* Mail body with plain Text */
20 message.setText("Hello User,"
21     + "\n\n If you read this, means mail sent with Java Mail API is successful");
22

```

To send an email in plain text, just pass the text in the message.setText() method.

## Send message

So far, we created a session and compose the message. Now it's time to send the message to the recipients. We will use `jakarta.mail.Transport` class for the same. It provides overloaded `send()` methods.

```
1 // Send the configured message in the session
2 Transport.send(message);
```

java

## 5.2.4 Send HTML messages

In terms of usability, HTML content is far superior to plain text. So, most of the time, we send emails in HTML content. Java Mail API supports sending emails in HTML content. To send an email with HTML content, you need to replace the `message.setText()` method with below code.

```
1 ...
2 message.setContent("Just discovered that Jakarta Mail is fun and easy to use",
3 "text/html");
4 ...
```

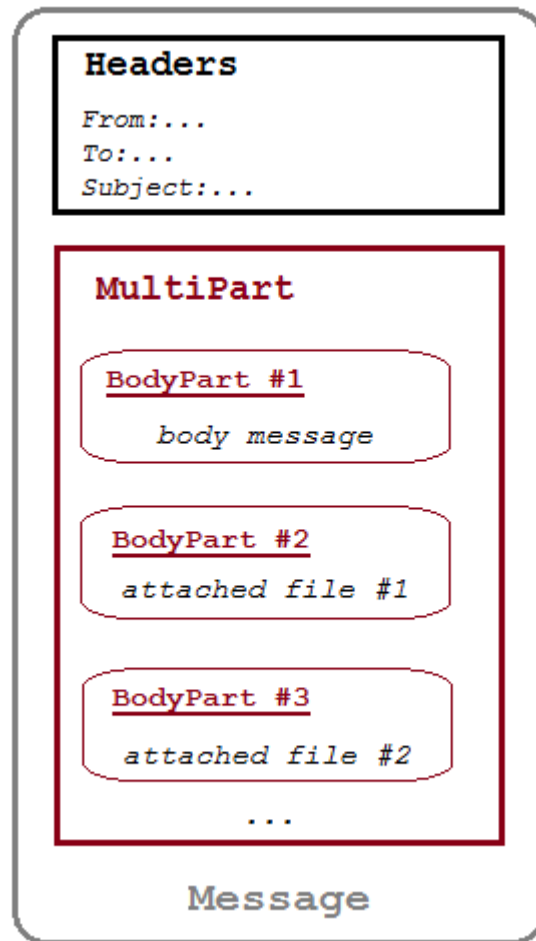
java

we'll be using the `setContent()` method to set content and specify `"text/html"` in the second argument, indicating the message has HTML content.

## 5.2.5 Send Email with Attachments

Apart from the previously mentioned steps, here are the differing steps involved in using the Jakarta Mail API for sending email attachments:

1. Create an instance of the `MimeMultipart` object that will be used for wrapping the `MimeBodyPart` body parts. **A Multipart acts like a container that keeps multiple body parts**, and it comes with methods for getting and setting its various subparts.
2. Then, set the first part of the multipart object by passing the actual message to it.
3. Next, set the second and next parts of the multipart object by adding the attachment.
4. Include the multipart in the message to be sent.
5. Send the message



```

1  // create an instance of multipart object
2  Multipart multipart = new MimeMultipart();
3
4  // create the 1st message body part
5  MimeBodyPart messageBodyPart = new MimeBodyPart();
6  // Add a plain message (HTML can also be added with setContent)
7  messageBodyPart.setText("Please find the attachment sent using Jakarta Mail");
8  // Add the BodyPart to the Multipart object
9  multipart.addBodyPart(messageBodyPart);
10
11 // 2nd. bodyPart with an attached file
12 messageBodyPart = new MimeBodyPart();
13 String filename = "C:/temp/file1.pdf";
14 messageBodyPart.attachFile(filename);
15 // Add the BodyPart to the Multipart object
16 multipart.addBodyPart(messageBodyPart);
17
18 // Add the multipart object to the message
19 message.setContent(multipart);
20
21 // Send the message with multipart MIME objects
22 Transport.send(message);

```

java

## 5.2.6 Send HTML emails with images

To add an image to your HTML email in Jakarta Mail, you can choose any of the three common options:



- CID image embedding
- inline embedding or Base64 encoding
- linked images.

## CID image embedding

To do CID image embedding, you need to create a MIME `multipart/related` message using the following code:

```
1 // 1st part of the message. An HTML code with a CID referenced image
2 Multipart multipart = new MimeMultipart("related");
3 MimeBodyPart htmlPart = new MimeBodyPart();
4 //add reference to your image to the HTML body 
5 String messageBody = "<p></p><img src=\"cid:my-test-image-cid\" alt=\"embedded img\" /></p>";
6 htmlPart.setText(messageBody, "utf-8", "html");
7 // Add the BodyPart to the Multipart object
8 multipart.addBodyPart(htmlPart);
9
10 // 2nd part of the message. The image with special CID header markers
11 MimeBodyPart imgPart = new MimeBodyPart();
12 // imageFile is the file containing the image
13 imgPart.attachFile(imageFile);
14 // or, if the image is in a byte array in memory, use
15 // imgPart.setDataHandler(new DataHandler(
16 //     new ByteArrayDataSource(bytes, "image/whatever")));
17 imgPart.setContentID("<my-test-image-cid>");
18 // Add the multipart object to the message
19 multipart.addBodyPart(imgPart);
20
21 // Add the multipart object to the message
22 message.setContent(multipart);
23
24 // Send the message with multipart MIME objects
25 Transport.send(message);
```

java

## Inline embedding (Base64 encoding)

For inline embedding or Base64 encoding, you should include the encoded image data in the HTML body similar to this:

```
1 
```

html



### HTML size

Each Base64 digit represents 6 bits of data, so your actual image code will be pretty long.

As this affects the overall size of the HTML message, it's better not to use inline large images.

To Base 64 encode/decode a stream we can use the `java.util.Base64` class.

```
1 byte[] fileContent = new FileInputStream(imageFile).readAllBytes();
2 String base64EncodedData = Base64.getEncoder().encodeToString(fileContent);
```

java



### Base64 encoding

Base64 is such a good option to send binary data over text protocols like HTTP without data loose.

This operation could be applied for any binary files or binary arrays. It's useful when we need to transfer binary content in JSON format such as from mobile app to REST endpoint.

**Image to Base64 String Conversion - Baeldung** (<https://www.baeldung.com/java-base64-image-string>)

## Linked images

Lastly, we have linked images that are essentially images hosted on some external server that you then create a link to. You can do that using the `img` tag in the HTML body like so

```
1 
```

html



### Debug Jakarta Mail

Debugging plays a critical role in testing of email sending.

In Jakarta Mail, it's pretty straightforward. Set debug to true in the properties of your email code:

```
props.put("mail.debug", "true");
```

As a result, you will get a step by step description of how your code is executed. If any problem with sending your message appears, you will instantly understand what happened and at which stage.

## 5.2.7 Common Exceptions when using Gmail SMTP

While sending an email with any of the above methods, you might get the following exceptions, even your Gmail credentials are correct.



### Google security

It's important to check your account security. Change the following settings only if you are absolutely sure of what you are doing.

Do not share any of the password because your account can be used without your permission.

## Two-way authentication

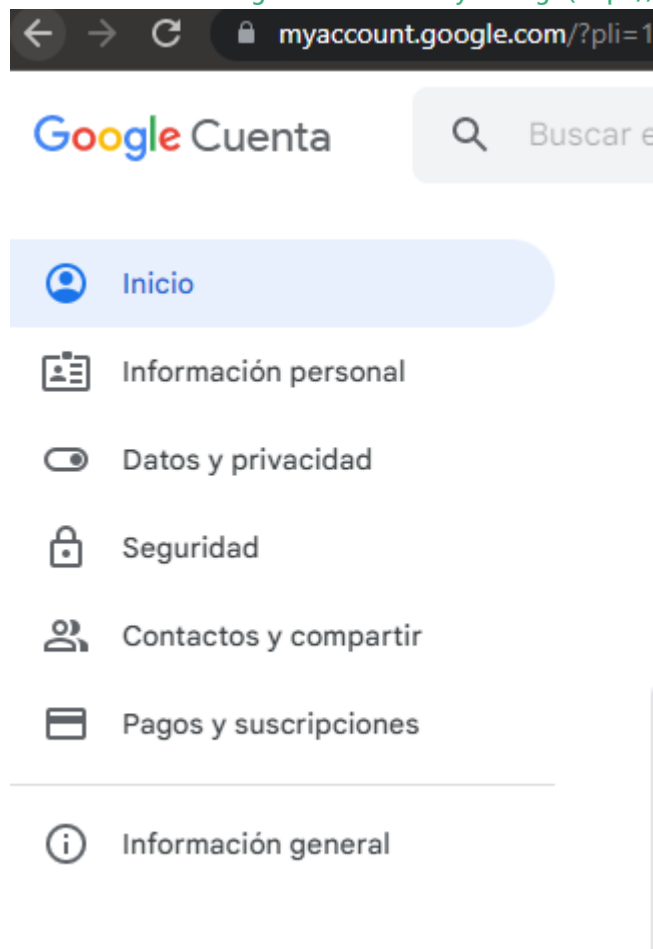
```
1 Error while trying to send mail: 534-5.7.9 Application-specific password required. Learn more at
2 534 5.7.9 https://support.google.com/mail/?p=InvalidSecondFactor r10-20020a05600c458a00b003d35acb0fd7sm14828087wmo.34
3
4 jakarta.mail.AuthenticationFailedException: 534-5.7.9 Application-specific password required. Learn more at
5 534 5.7.9 https://support.google.com/mail/?p=InvalidSecondFactor r10-20020a05600c458a00b003d35acb0fd7sm14828087wmo.34
6
7 at com.sun.mail.smtp.SMTPTransport$Authenticator.authenticate(SMTPTransport.java:947)
8 at com.sun.mail.smtp.SMTPTransport.authenticate(SMTPTransport.java:858)
9
```

java

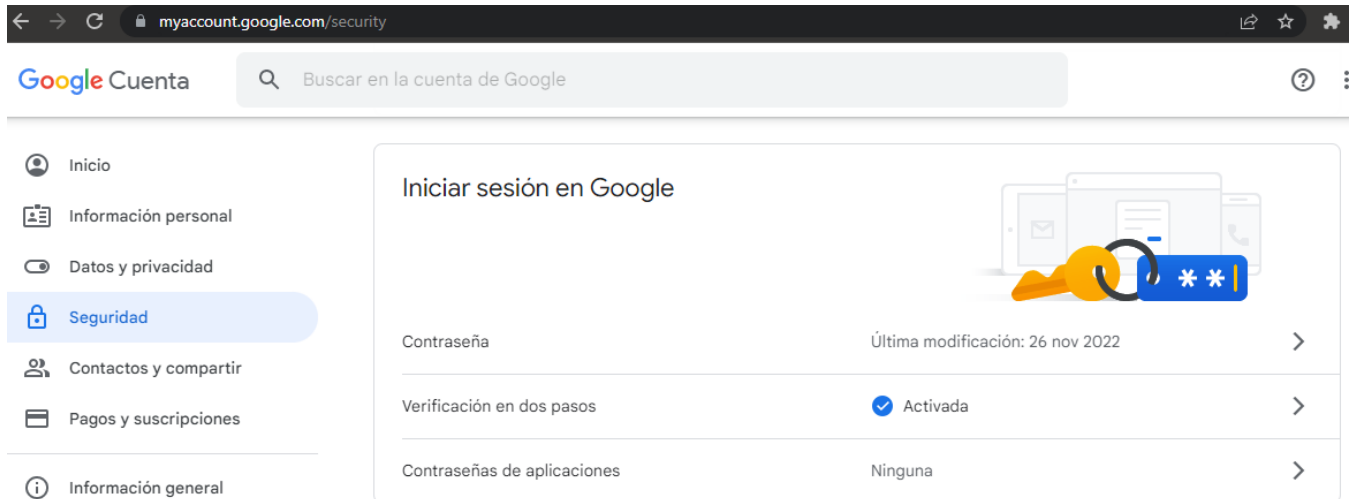
```
10     at com.sun.mail.smtp.SMTPTransport.protocolConnect(SMTPTransport.java:762)
11     at jakarta.mail.Service.connect(Service.java:364)
12     at jakarta.mail.Service.connect(Service.java:222)
13     at jakarta.mail.Service.connect(Service.java:171)
14     at jakarta.mail.Transport.send0(Transport.java:230)
15     at jakarta.mail.Transport.send(Transport.java:100)
    ...
```

The exception (`jakarta.mail.AuthenticationFailedException`) talks about the Application-specific password required. This is because your Gmail account is configured for 2-step verification so your direct Gmail password won't work here due to security reasons. To rectify this, you need to follow the below steps.

1. Sign in with your Google account
2. Go to your Google account or just click on the link [Google account security settings \(https://myaccount.google.com/?pli=1\)](https://myaccount.google.com/?pli=1)



3. Click on Security from the left menu.
4. Scroll a bit down to reach the "Signing in to Google" section – most probably 3rd section from the top.
5. Here you can see 2-Step Verification is turned On.



6. Click on App Password just below it. Google will ask you to re-enter the password.

7. On the next screen, you need to select the App and Device.

8. From the "Select app" dropdown, just select Other (Custom name).

9. Give an appropriate name like "Web" and press Generate button.

## ← Contraseñas de aplicaciones

Las contraseñas de aplicación te permiten iniciar sesión en tu cuenta de Google desde aplicaciones instaladas en dispositivos que no admiten la verificación en dos pasos. No tendrás que recordarlas porque solo tienes que introducirlas una vez. [Más información](#)

**Tus contraseñas de aplicación**

Nombre	Fecha de creación	Último uso
Jakarta Mail	0:47	—

### Contraseña de aplicación generada

Tu contraseña de aplicación para el dispositivo

**y11d ckm qjpo evlt**

**Cómo utilizarla**

Accede a la sección de configuración de tu cuenta de Google en la aplicación o el dispositivo que estés intentando configurar. Sustituye tu contraseña por la contraseña de 16 caracteres que se muestra arriba. Al igual que la contraseña normal, esta contraseña de aplicación ofrece acceso completo a tu cuenta de Google. No tendrás que recordarla, así que no la escribas ni la compartas con nadie.

**HECHO**

Email

securesally@gmail.com

Password

••••••••••••••••

10. You will a generated password on the screen with a popup.

11. Save and use this password for all your Java mail code.

## Less secure apps

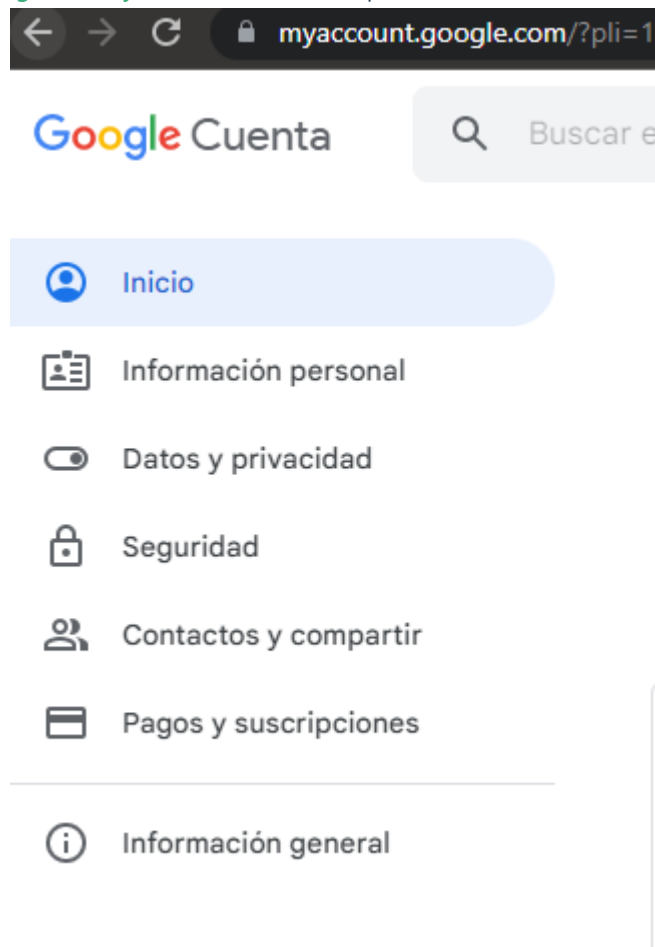
```

1  Error while trying to send mail: 535-5.7.8 Username and Password not accepted. Learn more at
2  535 5.7.8 https://support.google.com/mail/?p=BadCredentials o9-20020a05600c510900b003c6f8d30e40sm1560227wms.31 - gsm
3
4  jakarta.mail.AuthenticationFailedException: 535-5.7.8 Username and Password not accepted. Learn more at
5  535 5.7.8 https://support.google.com/mail/?p=BadCredentials o9-20020a05600c510900b003c6f8d30e40sm1560227wms.31 - gsm

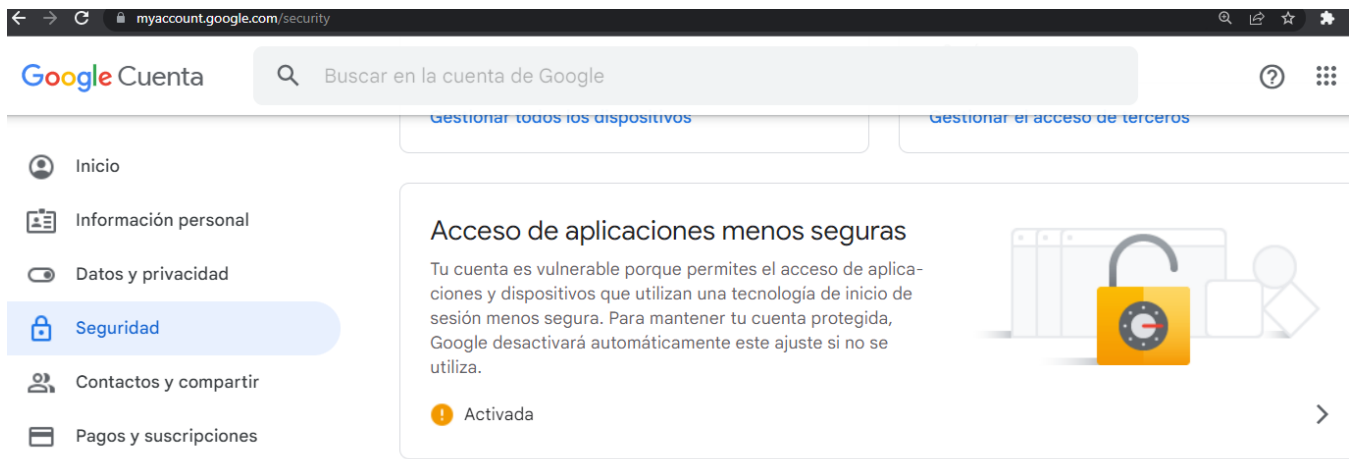
```

```
6
7   at com.sun.mail.smtp.SMTPTransport$Authenticator.authenticate(SMTPTransport.java:947)
8   at com.sun.mail.smtp.SMTPTransport.authenticate(SMTPTransport.java:858)
9   at com.sun.mail.smtp.SMTPTransport.protocolConnect(SMTPTransport.java:762)
10  at jakarta.mail.Service.connect(Service.java:364)
11  at jakarta.mail.Service.connect(Service.java:222)
12  at jakarta.mail.Service.connect(Service.java:171)
13  at jakarta.mail.Transport.send0(Transport.java:230)
14  at jakarta.mail.Transport.send(Transport.java:100)
15  ...
```

1. Sign in with your Google account
2. Go to your Google account or just click on the link [Google less secure apps settings](https://www.google.com/settings/security/) (<https://www.google.com/settings/security/>) to advance until step 5.



3. Click on Security from the left menu.
4. Scroll a bit down to reach the "Less secure applications".
5. You will find it disabled. Enter the section to turn it On.



6. Save and use your account password for all your Java mail code.