

Lesson 06 Demo 02

Implementing HTTP Client in Java

Objective: Implement the use of HTTP Client in Java 11 to efficiently send HTTP requests and handle responses

Tools Required: Eclipse IDE

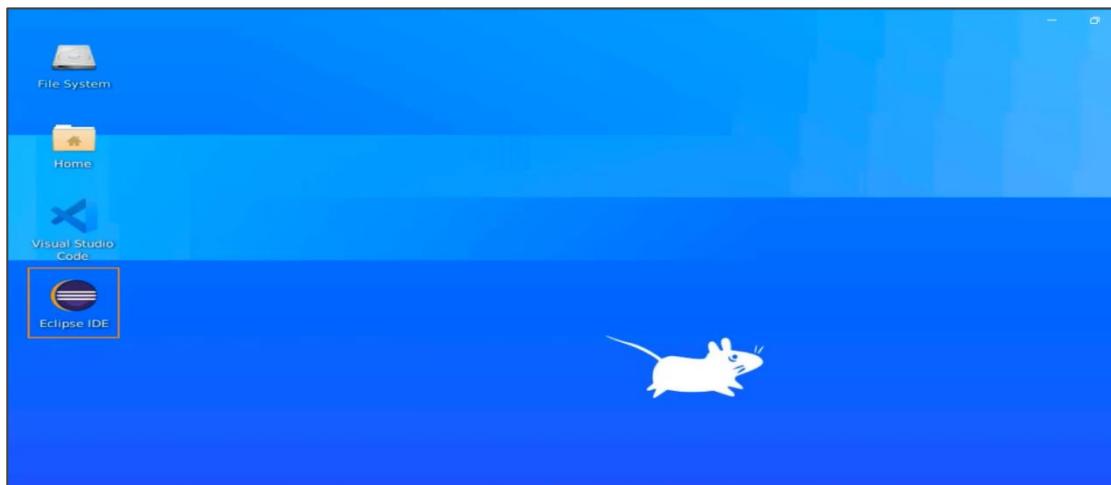
Prerequisites: None

Steps to be followed:

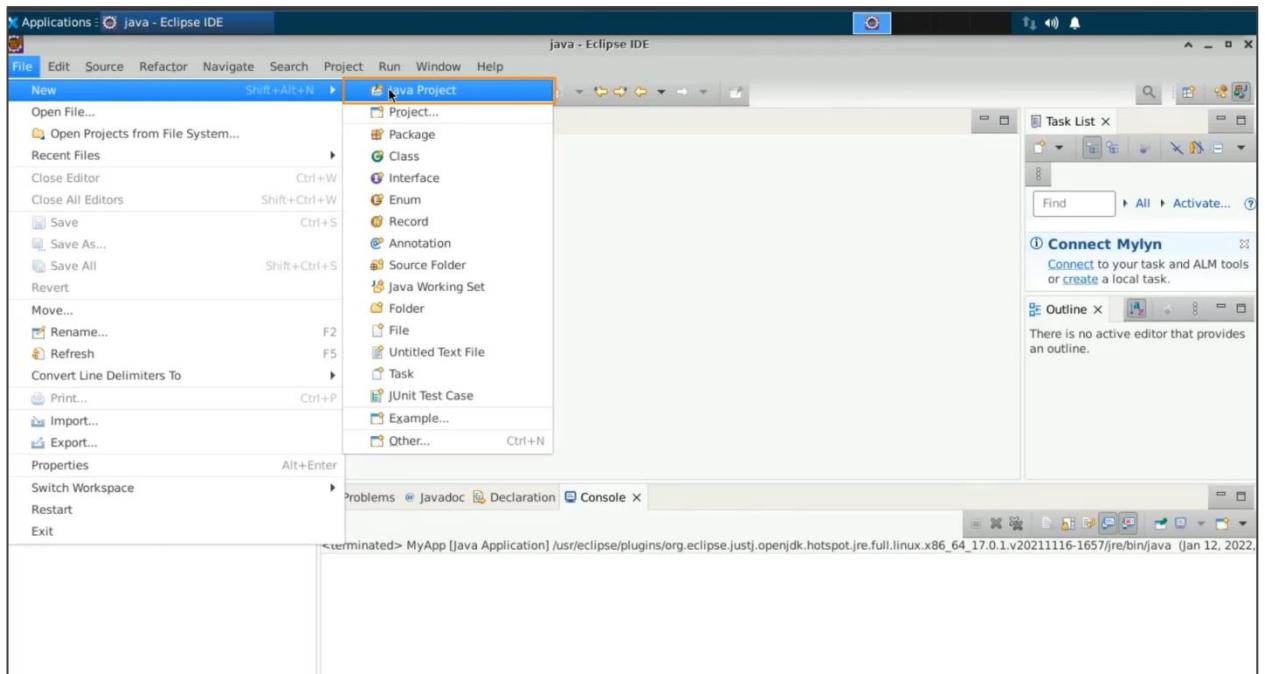
1. Open the Eclipse IDE and create a new Java project
2. Open a web browser and search for newsapi.org
3. Log in to your account to get an API key
4. Hit the URL to get the data in the form of a response
5. Record and concatenate the API key as a separate variable in the Eclipse IDE
6. Create HTTP client object, HTTP request object, and then the response objects
7. Execute the code

Step 1: Open the Eclipse IDE and create a new Java project

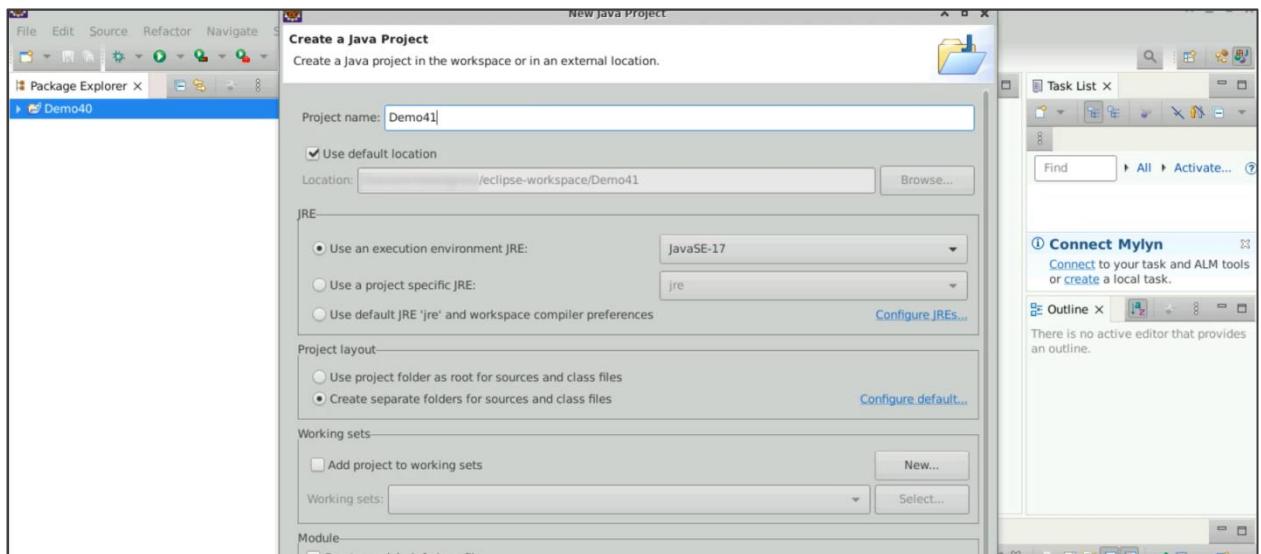
1.1 Open the Eclipse IDE



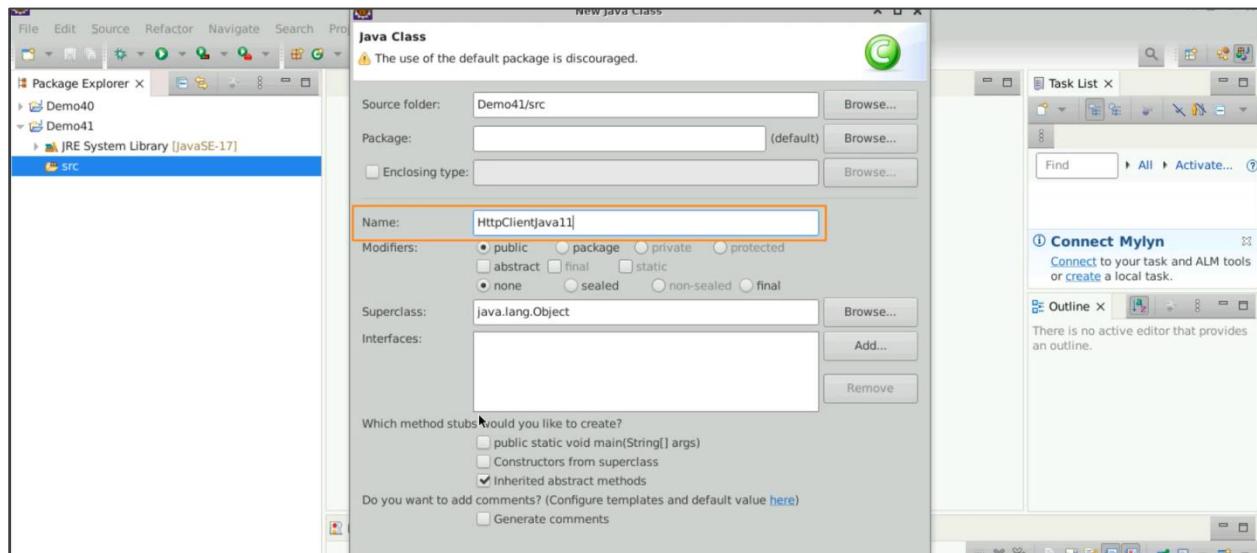
1.2 Select File, then New, and then Java project



1.3 Name the project Demo41, uncheck Create a module-info.java file, and press Finish

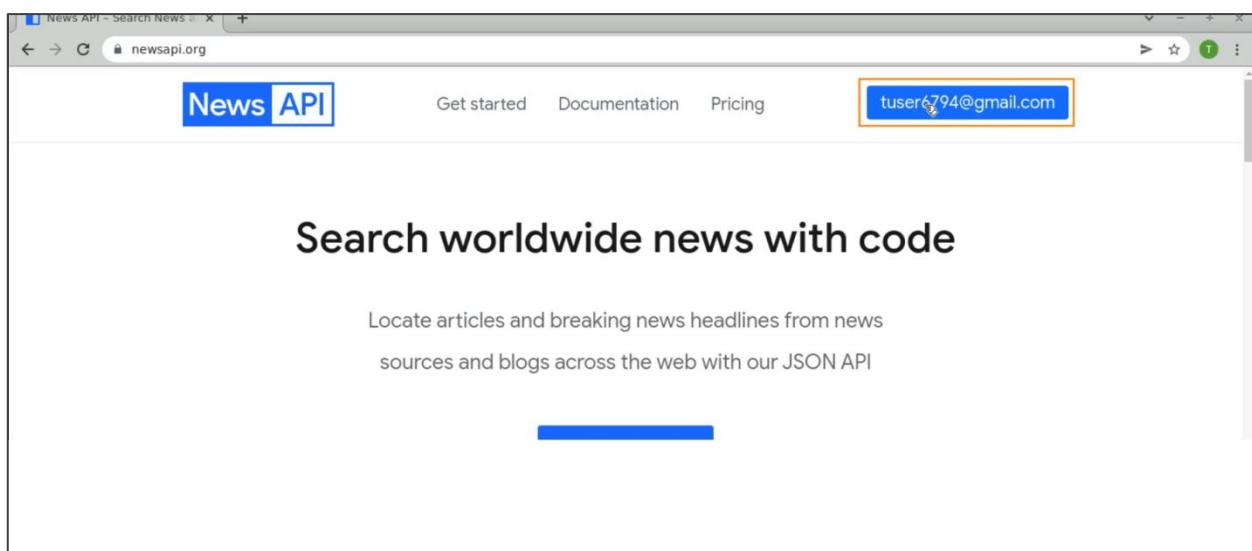


1.4 With **Demo41** selected, right-click on the **src**, and create a new class. Name this class **HttpClientJava11**, select the main method, and then select **Finish**



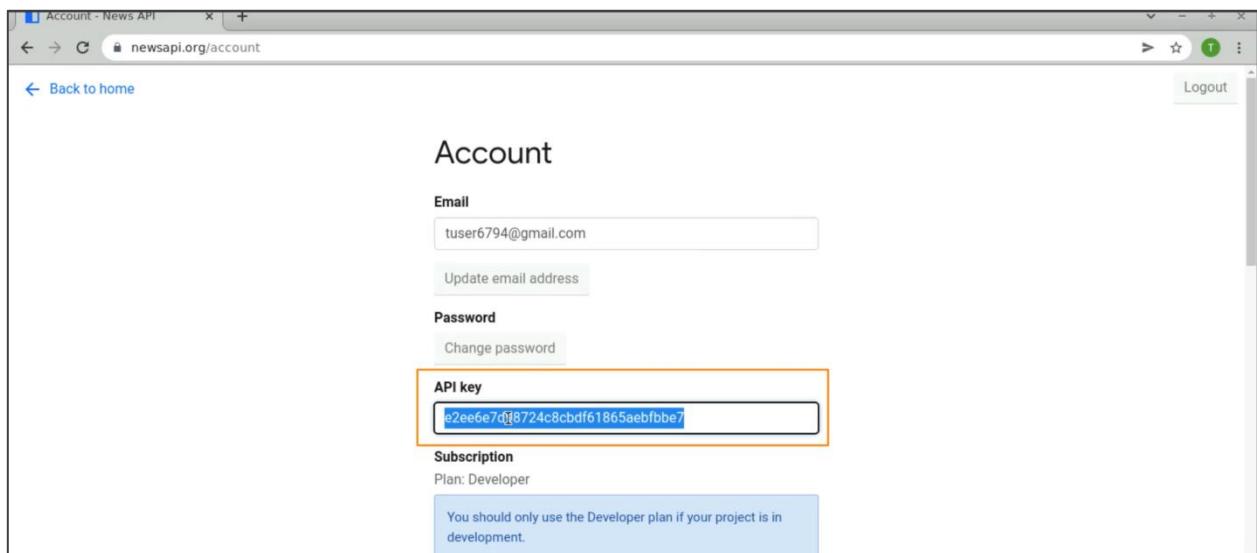
Step 2: Open a web browser and search for newsapi.org

2.1 Open a web browser and search for **newsapi.org**. As you can see, it is already logged in here

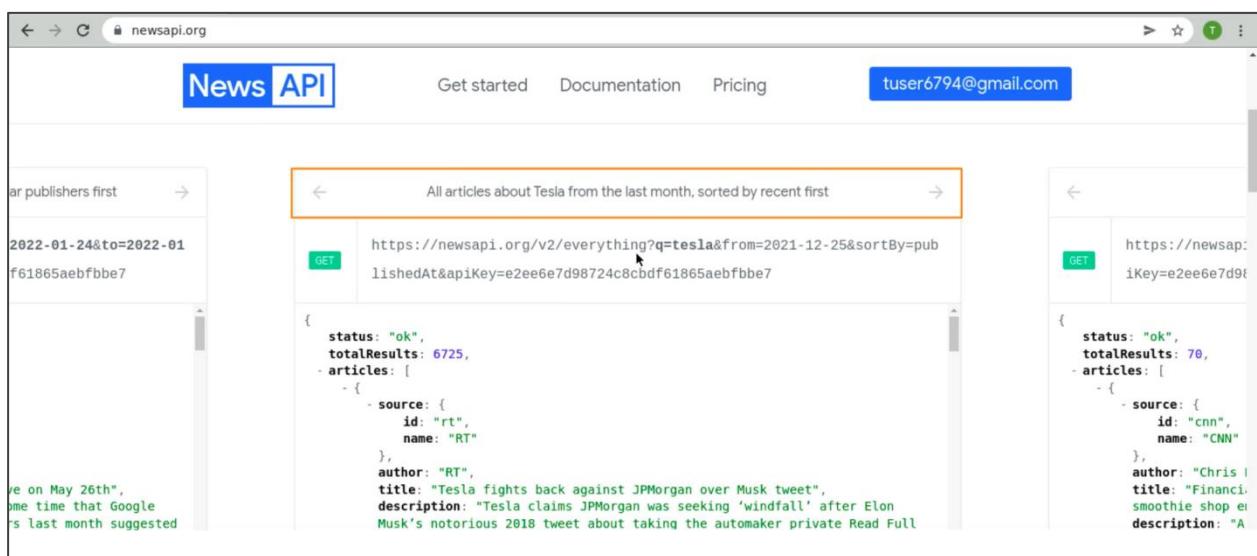


Step 3: Log in to your account to get an API key

3.1 You need to log in to your account to get an **API key**.



3.2 There are some standard URLs that can provide data, such as articles related to Tesla from the last month



Step 4: Hit the URL to get the data in the form of a response

4.1 These URLs will have your API keys associated, and you can hit the URL to get data in the form of a response. First, copy this URL.

```

{
  "status": "ok",
  "totalResults": 10,
  "articles": [
    {
      "source": {
        "id": "fortune",
        "name": "Fortune"
      },
      "author": "Mike Biagioli",
      "title": "A From Tiger",
      "description": "You can be innovative on theory wrong. I",
      "url": "https://www.cnbc.com/2022/01/24/investing/evergrande-shenzen-hq-01112022-restricted-super-tease.jpg",
      "urlToImage": "https://cdn.cnn.com/cnnnext/dam/assets/220124220138-evergrande-shenzen-hq-01112022-restricted-super-tease.jpg",
      "publishedAt": "2022-01-25T04:19:00Z",
      "content": null
    }
  ]
}

```

4.2 Paste it here. Now, when you hit this URL, you can see the JSON data comes as a response. The status is OK, and these are articles from the New York Times and so on.

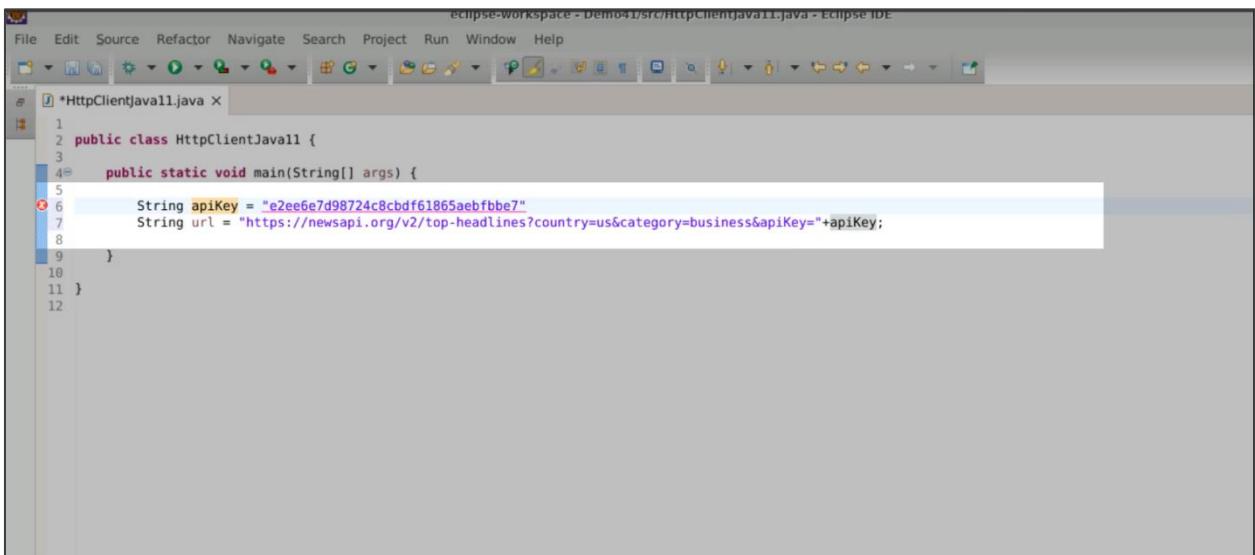
```

{
  "status": "ok",
  "totalResults": 70,
  "articles": [
    {
      "source": {
        "id": "new-york-times",
        "name": "The New York Times"
      },
      "author": "Coral Murphy Marcos, Mohammed Hadi",
      "title": "S&P 500 Rallies After Touching Correction Territory, Erasing Day's Losses",
      "description": "The S&P 500 slid into correction territory before rallying, and signals on Wall Street show that investors are becoming more pessimistic about the economy's prospects after a sharp drop in December.",
      "url": "https://www.nytimes.com/2022/01/24/business/stock-market-wall-street-correction.html",
      "urlToImage": "https://static01.nyt.com/newsgraphics/images/icons/default/proportCrop.png",
      "publishedAt": "2022-01-25T09:29:00Z",
      "content": "With Europe also struggling to contain inflation, which is already being driven higher by energy prices, this could be a serious problem for the eurozone economy, said Fiona Cincotta, an analyst at CIBC. [+336 chars]",
      "source": {
        "id": "cnn",
        "name": "CNN"
      },
      "author": "Chris Boyette, CNN",
      "title": "Florida shuts down all monoclonal antibody treatment sites after FDA decision to limit use of certain treatments not proven effective against Omicron - CNN",
      "description": "Florida is closing its monoclonal antibody treatment sites, health officials announced Monday, citing the US Food and Drug Administration's decision to limit the use of certain versions of the treatments that were found less effective against the now-dominant Omicron variant. [+557 chars]",
      "url": "https://www.cnn.com/2022/01/25/us/florida-closing-monoclonal-antibody-treatment-sites/index.html",
      "urlToImage": "https://cdn.cnn.com/cnnnext/dam/assets/211025035335-01-regeneron-monoclonal-antibody-treatment-super-tease.jpg",
      "publishedAt": "2022-01-25T08:25:00Z",
      "content": "Florida is closing its monoclonal antibody treatment sites, health officials announced late Monday, citing the US Food and Drug Administration's decision to limit the use of certain versions of the treatments that were found less effective against the now-dominant Omicron variant. [+557 chars]",
      "source": {
        "id": "cbs-news",
        "name": "CBS News"
      },
      "author": "Associated Press",
      "title": "US stocks down significantly hours before opening bell - CBS News",
      "description": "U.S. stocks were trading in negative territory early Tuesday hours before markets opened after seeing Monday as the Dow fell more than 1,000 points early in the day before recovering and ending the day higher. [+1895 chars]",
      "url": "https://www.cbsnews.com/pictures/us-stocks-down-significantly-hours-before-opening-bell-cbs-news/",
      "urlToImage": "https://static01.nyt.com/images/2022/01/25/business/stock-market-wall-street-correction/stock-market-wall-street-correction-jpgve-1ktx11.jpg",
      "publishedAt": "2022-01-25T08:23:00Z",
      "content": "U.S. stocks were trading in negative territory early Tuesday hours before markets opened after seeing Monday as the Dow fell more than 1,000 points early in the day before recovering and ending the day higher. [+1895 chars]",
      "source": {
        "id": "cnn",
        "name": "CNN"
      },
      "author": "Chelsea Ong",
      "title": "Strong recovery for India's smartphone market in 2021 with Xiaomi leading the way and South Korean smartphone Samsung taking second place - CNN",
      "description": "Chinese smartphone makers dominated the top five spots in 2021, with Xiaomi leading the way and South Korean smartphone Samsung taking second place. [+5294 chars]",
      "url": "https://www.cnn.com/2022/01/25/technology/strong-recovery-for-indias-smartphone-market-in-2021-with-recordshipments/index.html",
      "urlToImage": "https://image.cnbcm.com/api/v1/image/107005778-1643090783885-gettyimages-1229294849-kachroo-notitle201024_np0ts.jpeg",
      "publishedAt": "2022-01-25T06:27:04Z",
      "content": "Xiaomi MI, Realme and Samsung Logos are seen on a billboard of a Electronics shop in Sopore, District Baramulla, Jammu and Kashmir, India on 28 October 2020. [+]India's smartphone market made a strong ... [+3334 chars]",
      "source": {
        "id": "cbs-local.com",
        "name": "CBS Local"
      },
      "author": "Jennifer McRae",
      "title": "King Soopers Union Members Ratify 3-Year Contract That Would End Strike - CBS Denver",
      "description": "Members of the UFCW Local 7, the union representing King Soopers workers, voted Monday on a contract that would end the strike. [+]",
      "url": "https://denver.cbslocal.com/2022/01/24/king-soopers-strike-vote-union/",
      "urlToImage": "https://denver.cbslocal.com/wp-content/uploads/sites/15999806/2022/01/KING-SOOPERS-STRIKE-SPKG.transfer_frame_114.jpeg?w=1500",
      "publishedAt": "2022-01-25T04:45:00Z",
      "content": "DENVER (CBS4) - Members of the UFCW Local 7, the union representing King Soopers workers, voted to ratify a contract that would end the strike Monday night. Employees returned to the store on Friday after 1895 chars",
      "source": {
        "id": "cnn",
        "name": "CNN"
      },
      "author": "Lana He, CNN Business",
      "title": "Evergrande asks international creditors to extend time to file legal action over its debt",
      "description": "The Chinese developer is still trying to buy time to restructure some of its offshore creditors, who have threatened to take legal action over the embattled Chinese developer's plans to restructure the business. [+]",
      "url": "https://www.cnn.com/2022/01/24/investing/evergrande-shenzen-hq-01112022-restricted-super-tease.jpg",
      "urlToImage": "https://cdn.cnn.com/cnnnext/dam/assets/201242420138-evergrande-shenzen-hq-01112022-restricted-super-tease.jpg",
      "publishedAt": "2022-01-25T04:19:00Z",
      "content": null,
      "source": {
        "id": "fortune",
        "name": "Fortune"
      },
      "author": "Katie Graifeld, Vildana Hajric, Bloomberg",
      "title": "What's a 'crypto winter'? Why some investors are scared about a repeat of 2018's doldrums - Fortune",
      "description": "The term refers to a sharp collapse in crypto prices, followed by a long period of reduced trading activity. [+]",
      "url": "https://fortune.com/2022/01/24/crypto-winter-bitcoin-price-crash-ice-age-bear-market/",
      "urlToImage": "https://content.fortune.com/wp-content/uploads/2022/01/gettyImages-1237576675-e1643082463664.jpeg?resize=1200,600",
      "publishedAt": "2022-01-25T03:49:07Z",
      "content": "Skip to Content",
      "source": {
        "id": "cointelegraph",
        "name": "Cointelegraph"
      },
      "author": "Keira Wright",
      "title": "Bank of America says stablecoin adoption and CBDC is 'inevitable' - Cointelegraph",
      "description": "The Bank of America says that a CBDC in the U.S. would preserve the USD's status as the world's reserve currency. [+]",
      "url": "https://cointelegraph.com/news/bank-of-america-says-stablecoin-adoption-and-cbdc-is-inevitable",
      "urlToImage": "https://images.cointelegraph.com/images/1200_aHR0cHM6Ly9zMy5j2ludGVsZWdyXB0lmVbS91cGxvWRzLzIwMjIzMDEvMGUyNzgwOGUtMzUzM5000DExLTlkTTtYjE3TgzyZmUzNTFk"
    }
  ]
}

```

Step 5: Record and concatenate the API key as a separate variable in the Eclipse IDE

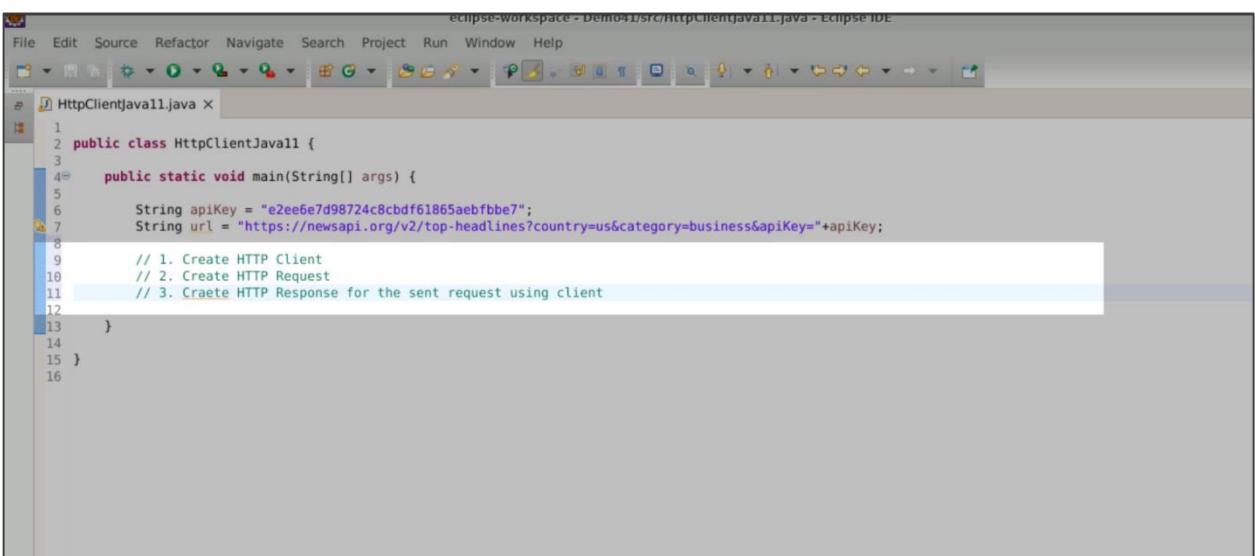
5.1 Let us create the URL endpoint. You have the news API URL coming in. As mentioned earlier, for the news API, you will have an API key provided by the website. Let us record this API key as a separate variable, and you can concatenate this API key here



```
eclipse-workspace - Demo4J/src/HttpClientJava11.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
* *HttpClientJava11.java X
1
2 public class HttpClientJava11 {
3
4     public static void main(String[] args) {
5
6         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
7         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
8
9     }
10
11 }
12
```

Step 6: Create HTTP client object, HTTP request object, and then the response objects

6.1 First, to send the request, you need to create an HTTP client object. Then, you will need to create an HTTP request object and the response objects. These are the three things you need to create in sequence. Let us follow these steps one by one:



```
eclipse-workspace - Demo4J/src/HttpClientJava11.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
* *HttpClientJava11.java X
1
2 public class HttpClientJava11 {
3
4     public static void main(String[] args) {
5
6         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
7         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
8
9         // 1. Create HTTP Client
10        // 2. Create HTTP Request
11        // 3. Create HTTP Response for the sent request using client
12
13     }
14
15 }
16
```

6.2 We can create an HTTP client using the java.net package's HTTP client API. It provides a builder for setting options like the version (e.g., HTTP/2) and timeout (e.g., 10 seconds) using the builder design pattern

```

eclipse-workspace - Demo41/src/HttpClientJava11.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
*HttpClientJava11.java X
1 import java.net.http.HttpClient;
2 import java.time.Duration;
3
4 public class HttpClientJava11 {
5
6     public static void main(String[] args) {
7
8         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
9         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
10
11     // 1. Create HTTP Client
12
13     // 3. Create HTTP Response for the sent request using client
14
15     HttpClient httpClient = HttpClient.newBuilder()
16         .version(HttpClient.Version.HTTP_2)
17         .connectTimeout(Duration.ofSeconds(10))
18         .build();
19
20
21     }
22
23 }
24
25

```

6.3 To send the request, we create an HTTP request object using the Builder API, specify the URI, and execute the **build** method. For a GET request without data, we use the **GET** method

```

*HttpClientJava11.java X
1 import java.net.URI;
2 import java.net.http.HttpClient;
3 import java.net.http.HttpRequest;
4 import java.time.Duration;
5
6 public class HttpClientJava11 {
7
8     public static void main(String[] args) {
9
10        String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
11        String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
12
13        // 1. Create HTTP Client
14        HttpClient httpClient = HttpClient.newBuilder()
15            .version(HttpClient.Version.HTTP_2)
16            .connectTimeout(Duration.ofSeconds(10))
17            .build();
18
19
20        // 2. Create HTTP Request
21        HttpRequest httpRequest = HttpRequest.newBuilder()
22            .GET()
23            .uri(URI.create(url))
24            .build();
25
26
27        // 3. Create HTTP Response for the sent request using client
28
29    }
30

```

6.4 To handle the response, we use **HttpClient.send** with inputs for the body handler and the HTTP request. The **HttpResponse.BodyHandlers** API assists in handling the response, particularly for strings, using the **ofString** method

```

1 import java.net.URI;
2 import java.net.http.HttpClient;
3 import java.net.http.HttpRequest;
4 import java.net.http.HttpResponse;
5 import java.time.Duration;
6
7 public class HttpClientJava11 {
8
9     public static void main(String[] args) {
10
11         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
12         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
13
14         // 1. Create HTTP Client
15         HttpClient httpClient = HttpClient.newBuilder()
16             .version(HttpClient.Version.HTTP_2)
17             .connectTimeout(Duration.ofSeconds(10))
18             .build();
19
20         // 2. Create HTTP Request
21         HttpRequest httpRequest = HttpRequest.newBuilder()
22             .GET()
23             .uri(URI.create(url))
24             .build();
25
26         // 3. Create HTTP Response for the sent request using client
27         httpClient.send(httpRequest, HttpResponse.BodyHandlers.ofString());
28
29     }
30 }
```

6.5 Click on the error bulb. It shows that this code can throw an exception, and you should surround your code with a try-catch. Thus, surround with try-catch to handle exceptions

```

1 *HttpClientJava11.java X
2
3 import java.net.http.HttpResponse;
4 import java.time.Duration;
5
6 public class HttpClientJava11 {
7
8     public static void main(String[] args) {
9
10         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
11         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
12
13         // 1. Create HTTP Client
14         HttpClient httpClient = HttpClient.newBuilder()
15             .version(HttpClient.Version.HTTP_2)
16             .connectTimeout(Duration.ofSeconds(10))
17             .build();
18
19         // 2. Create HTTP Request
20         HttpRequest httpRequest = HttpRequest.newBuilder()
21             .GET()
22             .uri(URI.create(url))
23             .build();
24
25         // 3. Create HTTP Response for the sent request using client
26         try {
27             httpClient.send(httpRequest, HttpResponse.BodyHandlers.ofString());
28         } catch (IOException e) {
29             // TODO Auto-generated catch block
30             e.printStackTrace();
31         } catch (InterruptedException e) {
32             // TODO Auto-generated catch block
33             e.printStackTrace();
34         }
35     }
36
37 }
```

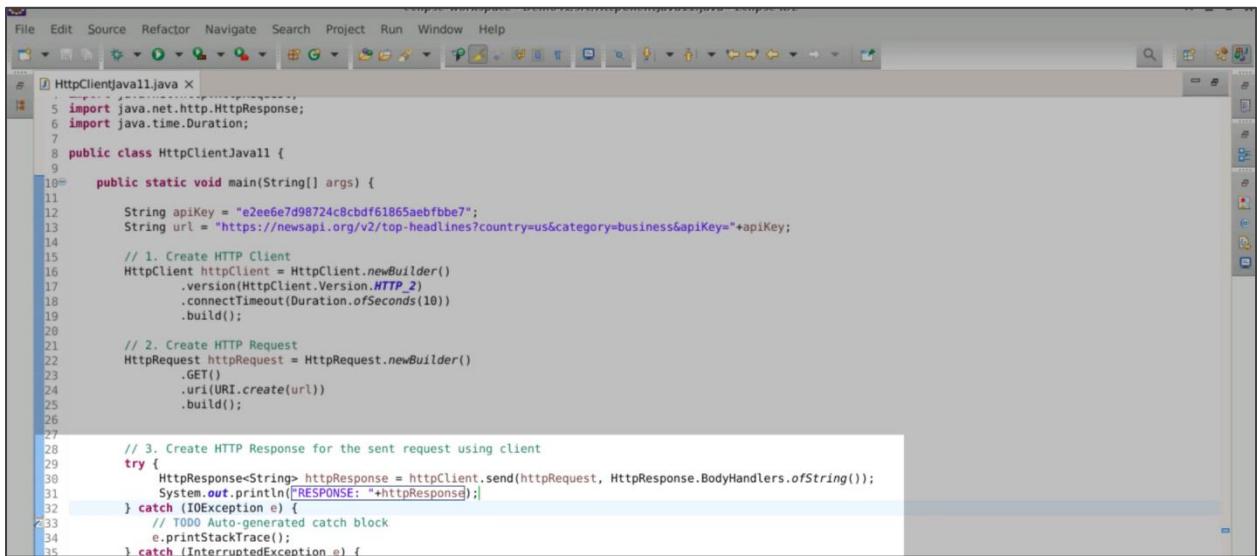
6.6 Create the left-hand side for this expression, which is your HTTP response. The HTTP response will be of type String. This means you are ready with the JSON, but JSON is a string. Thus, you have your HTTP response

```

8  public class HttpClientJava1 {
9
10 public static void main(String[] args) {
11
12     String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
13     String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey="+apiKey;
14
15     // 1. Create HTTP Client
16     HttpClient httpClient = HttpClient.newBuilder()
17         .version(HttpClient.Version.HTTP_2)
18         .connectTimeout(Duration.ofSeconds(10))
19         .build();
20
21     // 2. Create HTTP Request
22     HttpRequest httpRequest = HttpRequest.newBuilder()
23         .GET()
24         .uri(URI.create(url))
25         .build();
26
27
28     // 3. Create HTTP Response for the sent request using client
29     try {
30         HttpResponse<String> httpResponse = httpClient.send(httpRequest, HttpResponse.BodyHandlers.ofString());
31     } catch (IOException e) {
32         // TODO Auto-generated catch block
33         e.printStackTrace();
34     } catch (InterruptedException e) {
35         // TODO Auto-generated catch block

```

6.7 With the HTTP client, you can send a request and receive a response. We will print the response as it is, without any changes or formatting



```

File Edit Source Refactor Navigate Search Project Run Window Help
HttpClientJava1.java X
1 import java.net.http.HttpResponse;
2 import java.time.Duration;
3
4 public class HttpClientJava1 {
5
6     public static void main(String[] args) {
7
8         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
9         String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey="+apiKey;
10
11        // 1. Create HTTP Client
12        HttpClient httpClient = HttpClient.newBuilder()
13            .version(HttpClient.Version.HTTP_2)
14            .connectTimeout(Duration.ofSeconds(10))
15            .build();
16
17        // 2. Create HTTP Request
18        HttpRequest httpRequest = HttpRequest.newBuilder()
19            .GET()
20            .uri(URI.create(url))
21            .build();
22
23
24        // 3. Create HTTP Response for the sent request using client
25        try {
26            HttpResponse<String> httpResponse = httpClient.send(httpRequest, HttpResponse.BodyHandlers.ofString());
27            System.out.println("RESPONSE: "+httpResponse);
28        } catch (IOException e) {
29            // TODO Auto-generated catch block
30            e.printStackTrace();
31        } catch (InterruptedException e) {
32            // TODO Auto-generated catch block
33        }
34    }
35}

```

6.8 Let us run this code. As you can see, there is a response for URL get and you can note that the response code is 200, which means OK and that it's a successful request with the successful response

The screenshot shows the Eclipse IDE interface with the 'Console' tab selected. The output window displays the following text:

```
<terminated> HttpClientJava11 [Java Application] /usr/eclipse/plugins/org.eclipse.justj.openjdk.hotspot.jre.full.linux.x86_64_17.0.1.v20211116-1657/jre/bin/java (Jan 25, 2022, 11:10:00 AM - 11:10:02 AM)
RESPONSE: (GET https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=e2ee6e7d98724c8cbdf61865aebfbbe7) 200
```

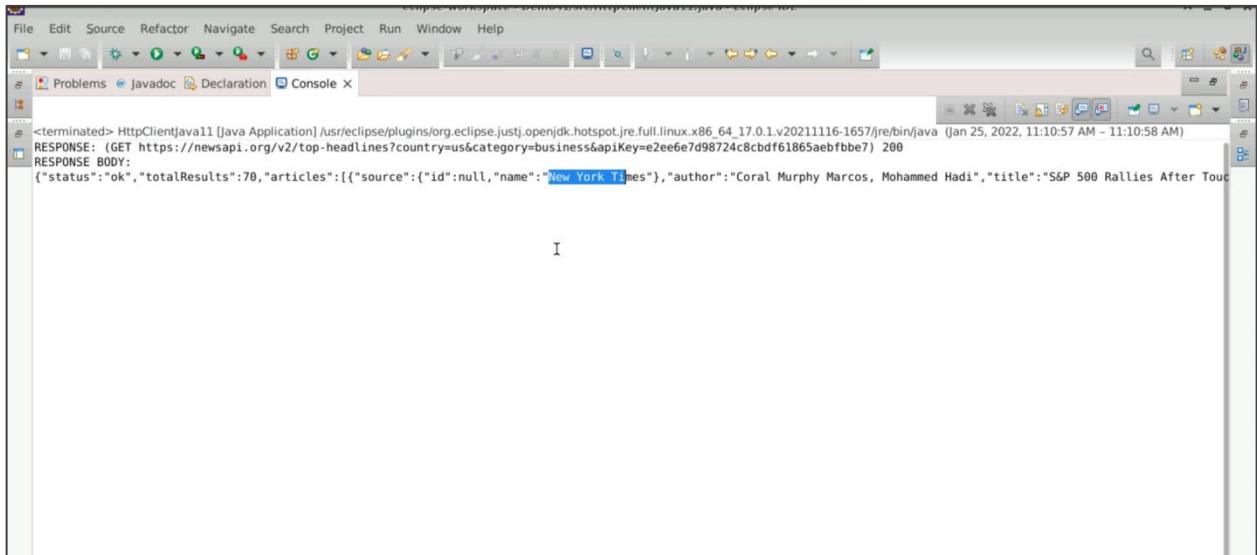
6.9 Get the contents of the response, which is like a body. Write **HTTP response.body** and convert it to a string if you wish. However, when you call **response.body**, it is already a string. Therefore, print the body

The screenshot shows the Eclipse IDE interface with the code editor open to the file 'HttpClientJava11.java'. The code is as follows:

```
File Edit Source Refactor Navigate Search Project Run Window Help
HttpClientJava11.java X
1 package com.simplilearn;
2 import java.net.http.HttpResponse;
3 import java.time.Duration;
4
5 public class HttpClientJava11 {
6
7     public static void main(String[] args) {
8
9         String apiKey = "e2ee6e7d98724c8cbdf61865aebfbbe7";
10        String url = "https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=" + apiKey;
11
12        // 1. Create HTTP Client
13        HttpClient httpClient = HttpClient.newBuilder()
14            .version(HttpClient.Version.HTTP_2)
15            .connectTimeout(Duration.ofSeconds(10))
16            .build();
17
18        // 2. Create HTTP Request
19        HttpRequest httpRequest = HttpRequest.newBuilder()
20            .GET()
21            .uri(URI.create(url))
22            .build();
23
24
25        // 3. Create HTTP Response for the sent request using client
26        try {
27            HttpResponse<String> httpResponse = httpClient.send(httpRequest, HttpResponse.BodyHandlers.ofString());
28            System.out.println("RESPONSE: " + httpResponse);
29            String body = httpResponse.body();
30            System.out.println("RESPONSE BODY:");
31            System.out.println(body);
32        } catch (IOException e) {
33            // TODO Auto-generated catch block
34            e.printStackTrace();
35        } catch (InterruptedException e) {
36            // TODO Auto-generated catch block
37            e.printStackTrace();
38        }
39    }
40}
```

Step 7: Execute the code

7.1 Next, run the final code. As you can see, after the response, you have the response body which says the status is OK, and there are 70 articles found. This is the same content you see when you hit this URL in the browser



```
<terminated> HttpClientJava11 [Java Application] /usr/eclipse/plugins/org.eclipse.justj/openjdk.hotspot.jre.full.linux.x86_64_17.0.1.v20211116-1657/jre/bin/java (Jan 25, 2022, 11:10:57 AM - 11:10:58 AM)
RESPONSE: (GET https://newsapi.org/v2/top-headlines?country=us&category=business&apiKey=e2ee6e7d98724c8cbdf61865aebfbbe7) 200
RESPONSE BODY:
{"status":"ok","totalResults":70,"articles":[{"source":{"id":null,"name":"New York Times"},"author":"Coral Murphy Marcos, Mohammed Hadi","title":"S&P 500 Rallies After Touching Record Lows, Nasdaq Gains 1%"}]}
```

By following these steps, you have successfully implemented the use of HTTP Client in Java 11 to efficiently send HTTP requests and handle responses.