HTML to PDF using Typescript & AWS Lambda

Phil Blenkinsop · Follow

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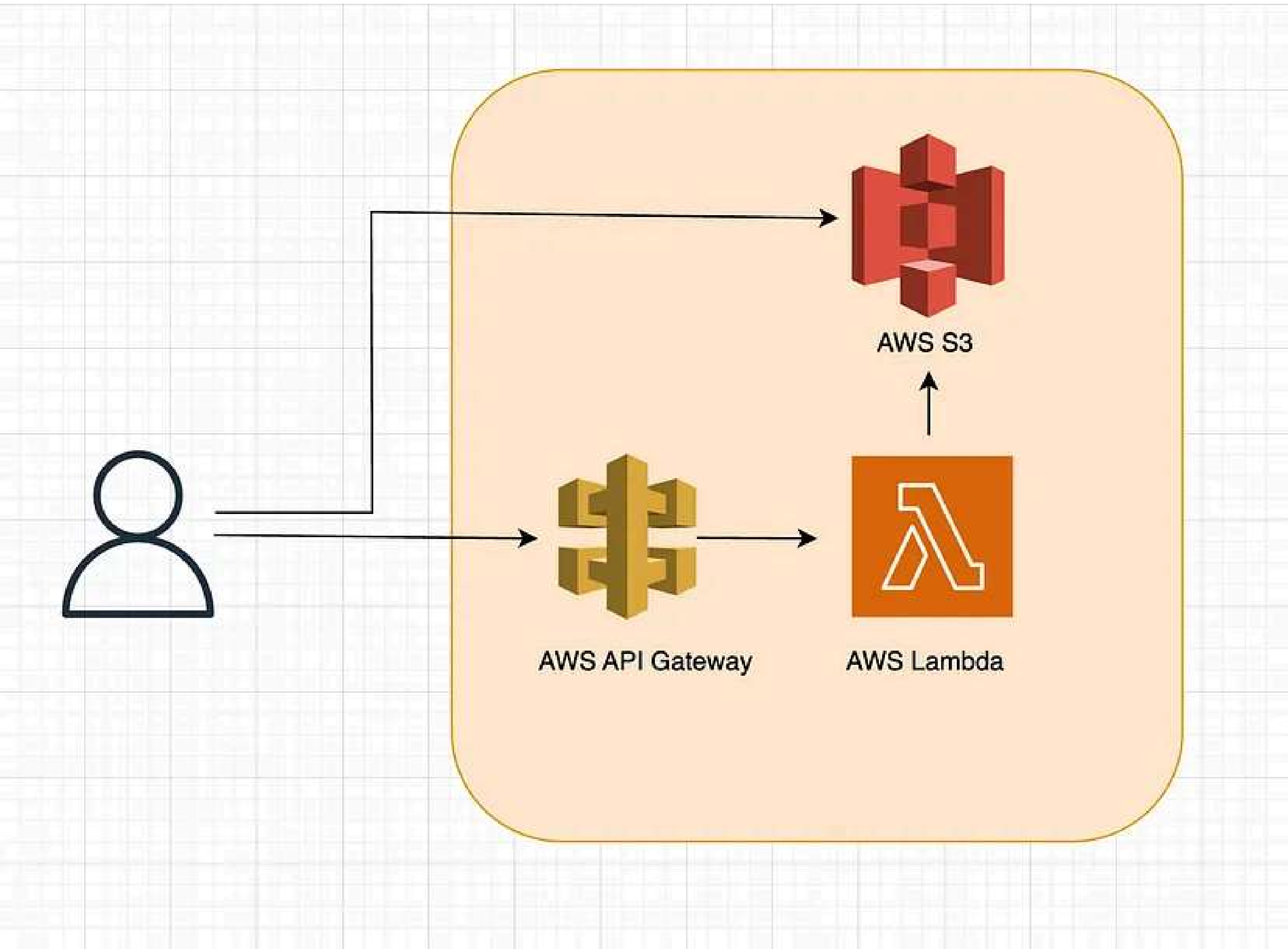
Creating a PDF is a requirement of many applications whether it be a receipt or report. They can often have complex layouts making HTML and CSS a great candidate for designing them.

In Javascript, there are a few packages for creating PDFs such as jsPDF and PDFKit which require you to add content to the PDF using Javascript functions like `doc.text("Hello world!", 10, 10)` . This makes it tricky to generate new PDFs without lots of code changes. However, Puppeteer is an ideal candidate as it can convert HTML to a PDF using a headless browser.

Unfortunately, Puppeteer is tricky to run in a serverless environment due to the binaries it needs to run a headless browser. `@sparticuz/chromium` solves this problem by providing the binaries needed to run chromium in a serverless environment.

For this tutorial we will be building an API that will accept a HTML string, create a PDF of the HTML, upload it to S3 and then return a download url for the PDF.



Architecture Diagram

1. **Project Setup and Dependencies**

Before we begin, we need to make sure we have Node.js installed. I would recommend using node version manager to do this and for this tutorial we are using version 18.18.2 of node. Now we also need to install the AWS CDK in order to use the CLI to initialise and deploy our app. I also prefer using yarn as the package manager so to install both we can run the following command.

```
npm i -g aws-cdk yarn
```

Once installed, make sure you have configured your AWS account with the CDK. https://docs.aws.amazon.com/cdk/v2/guide/getting_started.html

Next we’re going to create a directory to house the project and then initialise it using the AWS CDK CLI. This will create all the files and folders we need to organise the project.

```
mkdir html-pdf-serverless && cd "$_" && cdk init app --language typescript
```

Once the project is initialised, we can install the dependencies needed for our lambda function to generate a PDF and upload it to S3. As we are using yarn we can delete the `package-lock.json` before installing.

Note it’s important to install fixed versions of puppeteer-core and @sparticuz/chromium as puppeteer ships with a preferred version of chromium which are detailed on the puppeteer support page.

```
yarn add @aws-sdk/client-s3 @aws-sdk/s3-request-presigner @aws-sdk/lib-storage p
```

There are also some dev dependencies needed for build and typescript support.

```
yarn add -D @types/aws-lambda aws-lambda  esbuild
```

We need to make two changes to the `tsconfig.json` by adding `skipLibCheck: true` and `esModuleInterop: true` to the compiler options object. This allows our installed dependencies to work with typescript.

The last setup step we need to do is get the binaries needed to run the chromium headless browser in AWS Lambda. To achieve this, we will use a lambda layer which contains the necessary binaries torun chromium.As we installed version 19.6.0 of puppeteer, we need version 110.0.0 of chromium. Head to https://github.com/Sparticuz/chromium/releases, find version 110.0.0 and download `chromium-v110.0.0-layer.zip` , saving it to the root of the repository.

2. Create the API

Our rest API will be made up of 2 routes, one as a health check so we can confirm it has deployed properly, and the second to generate the PDF.

We'll start by creating the healthcheck endpoint and deploying it. Create a healthcheck lambda handler in `lambdas/healthcheck-lambda/index.ts` and add the following code to return a successful response.

```
import { APIGatewayProxyHandler } from "aws-lambda"

export const handler: APIGatewayProxyHandler = async () => {
    return {
        statusCode: 200,
        body: "Ok"
    }
  }
```

Now we can create the CDK resources to handle the lambda code. We modify `lib/html-pdf-serverless-stack.ts` to add a rest API, lambda and lambda integration. This will mean our healthcheck lambda is executed at the root path of the api.

```
import { Stack, StackProps } from 'aws-cdk-lib';
import { NodejsFunction } from 'aws-cdk-lib/aws-lambda-nodejs'
import { Construct } from 'constructs';
import { LambdaIntegration, RestApi } from 'aws-cdk-lib/aws-apigateway';

export class HtmlPdfServerlessStack extends Stack {
  constructor(scope: Construct, id: string, props?: StackProps) {
    super(scope, id, props);

    const healthcheckLambda = new NodejsFunction(this, 'HealthcheckLambda', {
      entry: 'lambdas/healthcheck-lambda/index.ts'
    })

    const api = new RestApi(this, 'HtmlToPdfRestApi', {
      restApiName: 'HTML PDF API',
    })

    api.root.addMethod("GET", new LambdaIntegration(healthcheckLambda, {
      requestTemplates: { 'application/json': '{ "statusCode": "200" }' }
    }))
  }
}
```

Now we can run `cdk deploy` and our rest API will be deployed to AWS. The stack should output the url of the api which we can use to test. Opening the outputted url in a browser should return the 'Ok' message we configured in the handler code.

```
Ok
```

3. Add the HTML to PDF Lambda

We can now create the handler for our HTML to PDF lambda in `lambdas/html-pdf-lambda/index.ts` . In the following code we take in the request body, convert the HTML string to a PDF buffer, upload it to S3 and then generate a presigned url to download the saved PDF. The request body the API accepts will include the HTML string and the name of the file that will be stored in S3.

```
import { S3Client, GetObjectCommand } from '@aws-sdk/client-s3'
import { getSignedUrl } from '@aws-sdk/s3-request-presigner'
import { Upload } from '@aws-sdk/lib-storage'
import { APIGatewayProxyEvent, APIGatewayProxyHandler } from 'aws-lambda'
import { generatePdfBuffer } from './generatePdfBuffer'

// process.env.AWS_REGION is a default env var provided in lambdas by AWS
const s3Client = new S3Client({ region: process.env.AWS_REGION })

export const handler: APIGatewayProxyHandler = async (event: APIGatewayProxyEven
    if (!event.body) {
        return {
            statusCode: 400,
            body: "Invalid request body"
        }
    }
    try {
        const requestBody = JSON.parse(event.body) as { html: string, s3Key: str

        const pdfBuffer = await generatePdfBuffer(requestBody.html)

        if(!pdfBuffer) {
            throw new Error('Failed to created PDF buffer from HTML')
        }

        const s3Upload = new Upload({
            client: s3Client,
            params: {
                Bucket: process.env.S3_PDF_BUCKET,
                Body: pdfBuffer,
                Key: requestBody.s3Key
            }
        })
        s3Upload.on("httpUploadProgress", (progress) => {
            console.log(progress);
        });
        await s3Upload.done()

        const presignedUrl = await getSignedUrl(
            s3Client,
            new GetObjectCommand({ Bucket: process.env.S3_PDF_BUCKET, Key: reque
            { expiresIn: 3600 }
        )

        return {
            statusCode: 200,
            body: JSON.stringify({
                pdfUrl: presignedUrl
            })
        }
    } catch (error) {
        console.log("Error converting HTML to PDF", error)
        return {
            statusCode: 500,
            body: "Internal server error"
        }
    }
}
```

We also need to add the function that will handle converting the HTML string to a PDF buffer. Add the following code to `lambdas/html-pdf-lambda/generatePdfBuffer.ts` to launch a headless browser, set the content of the page as the provided HTML and then convert it to a PDF buffer.

```
import chromium from '@sparticuz/chromium'
import puppeteer from 'puppeteer-core'
```

```
export const generatePdfBuffer = async (
  html: string,
): Promise<Buffer | undefined> => {
  let result = undefined
  let browser = null
  try {
    console.log('Launching browser')
    browser = await puppeteer.launch({
      args: chromium.args,
      defaultViewport: chromium.defaultViewport,
      executablePath: await chromium.executablePath(),
      headless: chromium.headless,
      ignoreHTTPSErrors: true,
    })

    console.log('Browser launched')
    const page = await browser.newPage()

    await page.setContent(html, {
      waitUntil: ['domcontentloaded', 'networkidle0', 'load'],
    })

    await page.evaluate('window.scrollTo(0, document.body.scrollHeight)')

    result = await page.pdf({ format: 'a4', printBackground: true })
  } catch (e) {
    console.log('Chromium error', { e })
  } finally {
    if (browser !== null) {
      await browser.close()
    }
  }
  return result
}
```

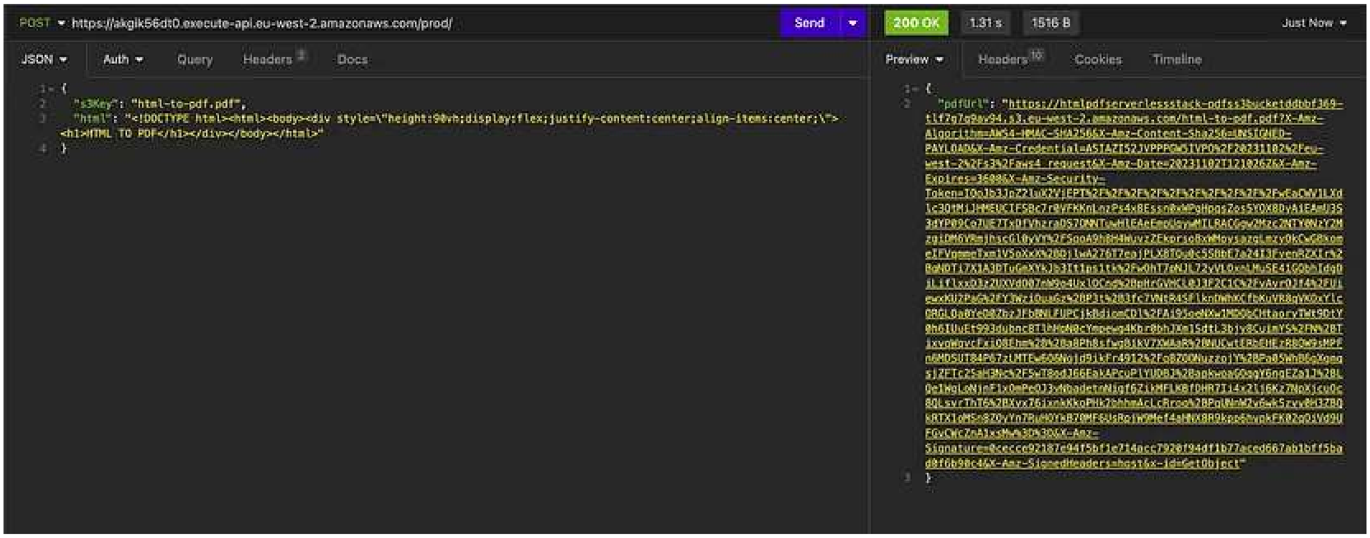
Now our lambda code is ready, we can wire it up to the API we created in the previous step. We need to add the S3 bucket to save the PDFs to, the HTML to PDF lambda, the chromium lambda layer and the rest api integration to wire it together. This leaves our `lib/html-pdf-serverless-stack.ts` looking like the below:

```
import { Duration, Stack, StackProps } from 'aws-cdk-lib';
import { Code, LayerVersion, Runtime } from 'aws-cdk-lib/aws-lambda';
import { Bucket } from 'aws-cdk-lib/aws-s3';
import { NodejsFunction } from 'aws-cdk-lib/aws-lambda-nodejs'
import { Construct } from 'constructs';
import { LambdaIntegration, RestApi } from 'aws-cdk-lib/aws-apigateway';

export class HtmlPdfServerlessStack extends Stack {
  constructor(scope: Construct, id: string, props?: StackProps) {
    super(scope, id, props);

    const pdfsS3Bucket = new Bucket(this, 'PDFsS3Bucket')

    const chromeAwsLambdaLayer = new LayerVersion(this, 'ChromeAWSLambdaLayer',
      layerVersionName: 'ChromeAWSLambdaLayer',
      compatibleRuntimes: [
        Runtime.NODEJS_18_X
      ],
      code: Code.fromAsset('chromium-v110.0.0-layer.zip')
    })

    const htmlToPdfLambda = new NodejsFunction(this, 'HtmlToPdfLambda', {
      entry: 'lambdas/html-pdf-lambda/index.ts',
      environment: {
        S3_PDF_BUCKET: pdfsS3Bucket.bucketName
      },
      layers: [chromeAwsLambdaLayer],
      bundling: {
        externalModules: [
          'aws-sdk'
        ],
        nodeModules: ['@sparticuz/chromium'],
      },
      timeout: Duration.seconds(30),
      runtime: Runtime.NODEJS_18_X,
      memorySize: 1024
    })
    pdfsS3Bucket.grantReadWrite(htmlToPdfLambda)

    const healthcheckLambda = new NodejsFunction(this, 'HealthcheckLambda', {
      entry: 'lambdas/healthcheck-lambda/index.ts'
    })

    const api = new RestApi(this, 'HtmlToPdfRestApi', {
      restApiName: 'HTML PDF API',
    })

    api.root.addMethod("GET", new LambdaIntegration(healthcheckLambda, {
      requestTemplates: { 'application/json': '{ "statusCode": "200" }' }
    }))
    api.root.addMethod("POST", new LambdaIntegration(htmlToPdfLambda, {
      requestTemplates: { 'application/json': '{ "statusCode": "200" }' }
    }))

  }
}
```

On the HTML to PDF lambda, we've added the name of the S3 bucket as an environment variable so we can upload the PDFs to it. Adding `@sparticuz/chromium` to the nodeModules array of the bundling config tells the bundler not to include this package during the bundling process as it's already available in the runtime due to our lambda layer. Finally, we've registered the lambda layer so that it'll be attached during runtime and increased the timeout and memory size of the lambda. This is because launching the browser is an intensive task that needs processing power and we don't want our lambda to return before it has finished.

Again we can run `cdk deploy` and our changes will be deployed to AWS. Using the same outputted url from the stack, we can test it using a REST client such as Insomnia or Postman with the following body.

```
{
 "s3Key": "html-to-pdf.pdf",
 "html": "<!DOCTYPE html><html><body><div style=\"height:90vh;display:flex;justi
}
```



https://akgik56dt0.execute-api.eu-west-2.amazonaws.com/prod/

```
{
  "s3Key": "html-to-pdf.pdf",
  "html": "<!DOCTYPE html><html><body><div style=\"height:90vh;display:flex;justify-content:center;align-items:center;\">
<h1>HTML TO PDF</h1></div></body></html>"
}
```

```
{
  "pdfUrl": "https://htmlpdfserverlessstack-pdfss3bucketddbbf369-
tlf7g7g9av94.s3.eu-west-2.amazonaws.com/html-to-pdf.pdf?X-Amz-
Algorithm=AWS4-HMAC-SHA256&X-Amz-Content-Sha256=UNSIGNED-
PAYLOAD&X-Amz-Credential=ASIAZT52JVPPPGW5IVPO%2F20231102%2Feu-
west-2%2Fs3%2Faws4_request&X-Amz-Date=20231102T121026Z&X-Amz-
Expires=3600&X-Amz-Security-
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FGvCWcZnA1xsMw%3D%3D&X-Amz-
Signature=0cecce92187e94f5bf1e714acc7920f94df1b77aced667ab1bff5ba
d0f6b98c4&X-Amz-SignedHeaders=host&x-id=GetObject"
}
```
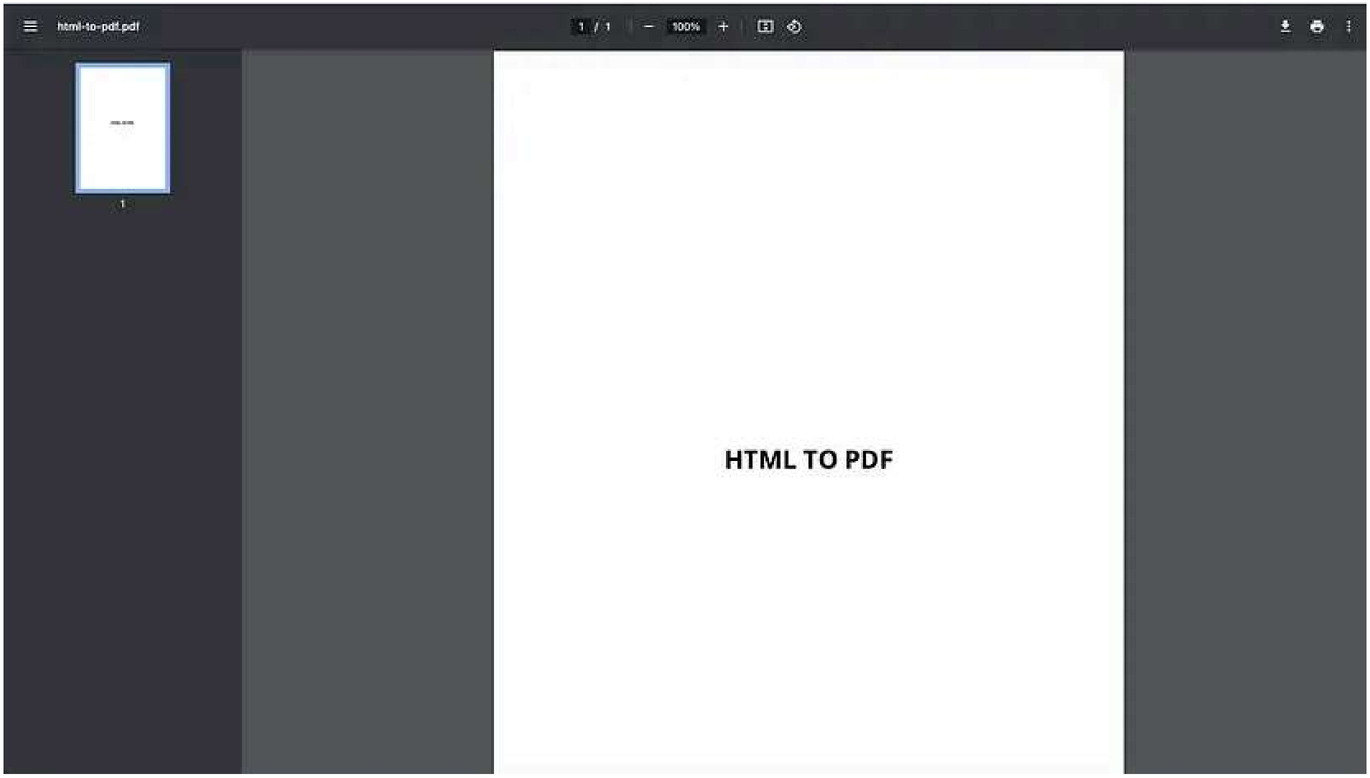

Test using Insomina

Then clicking the returned presigned URL to download the PDF shows us our HTML converted into the PDF document!



Generated PDF from HTML

Thanks for reading and you can check out the sample repo for the full code! https://github.com/blenky36/html-pdf-serverless

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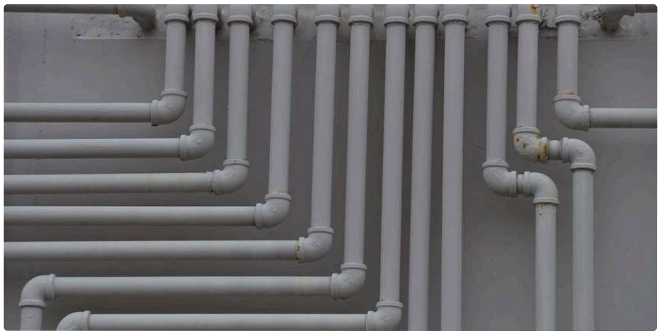

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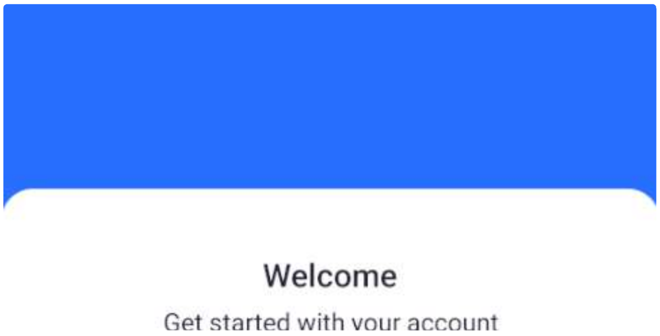

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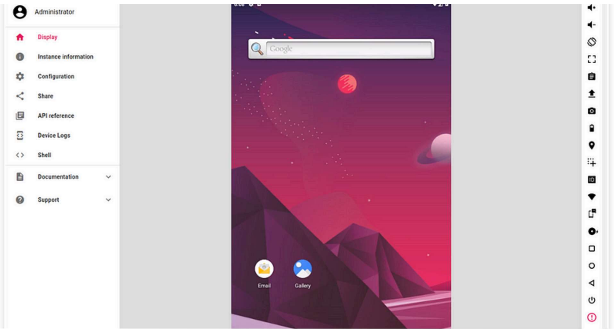

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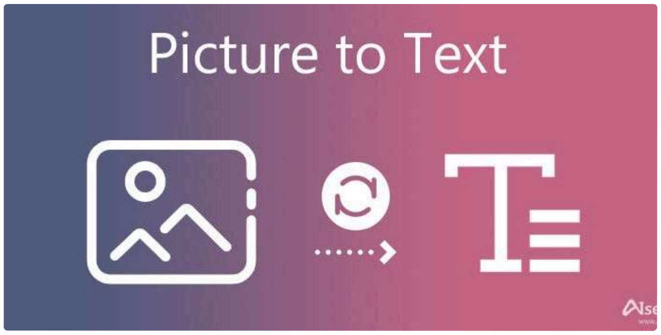

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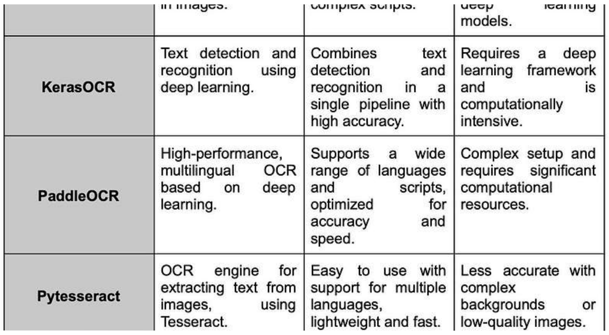

	in images.	complex scripts.	deep learning models.
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  await fetch('https://codingbeautydev.com');
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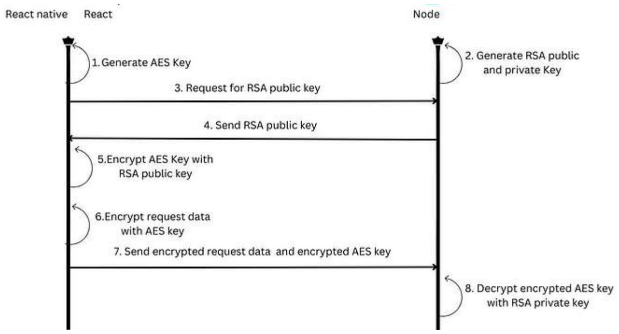
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Node
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2. Generate RSA public and private Key
3. Request for RSA public key
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