

AWS Project - Architect and Build an End-to-End AWS Web Application from Scratch, Step by Step

Services We'll be Using



AWS
Amplify



AWS
Lambda



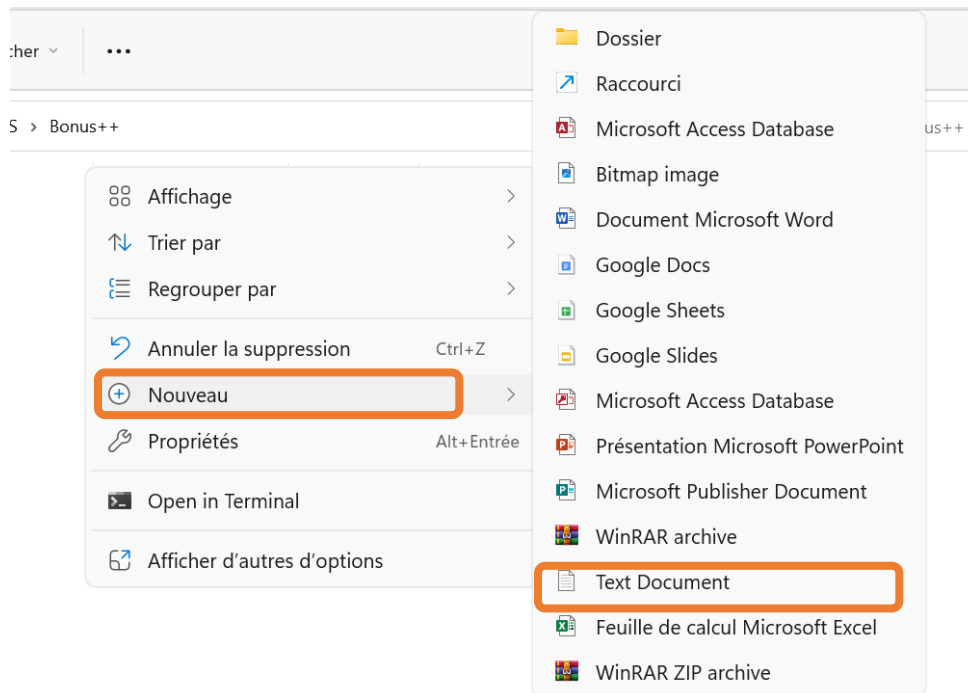
Amazon
API Gateway





Amazon
DynamoDB

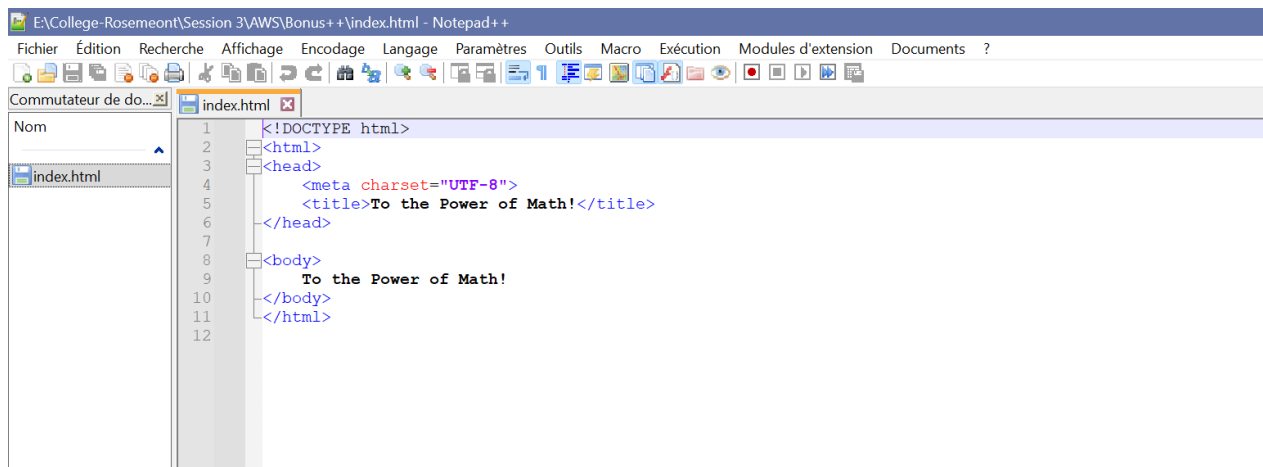
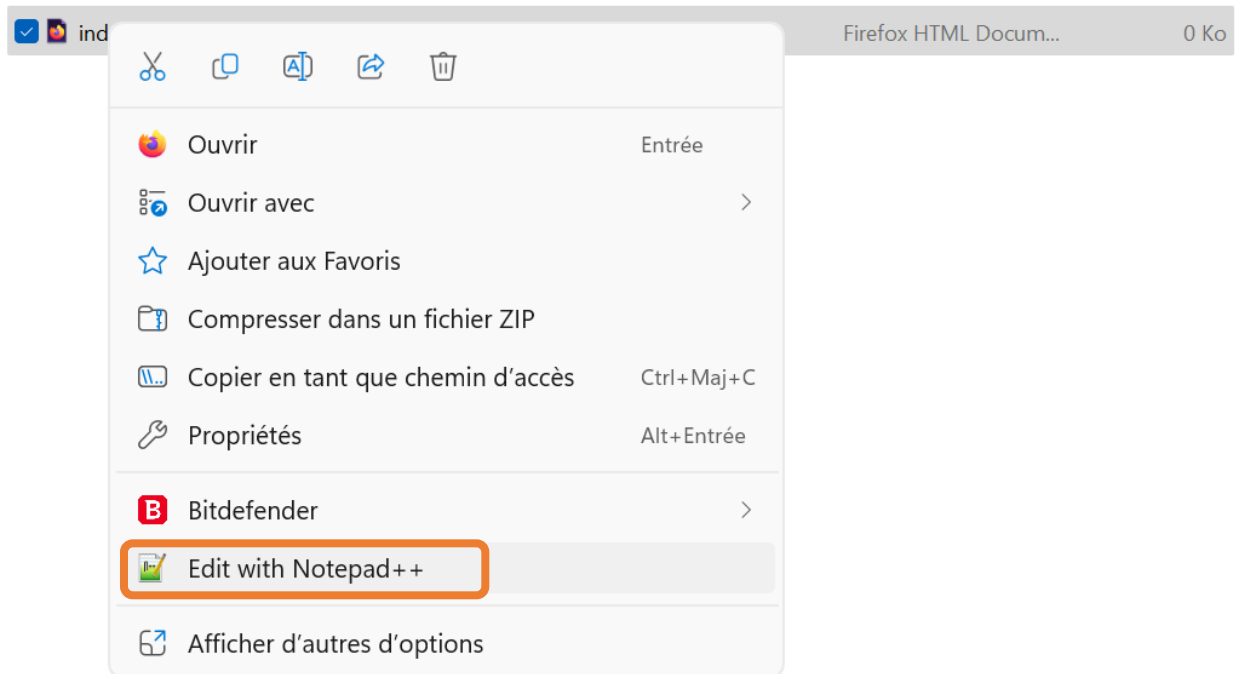


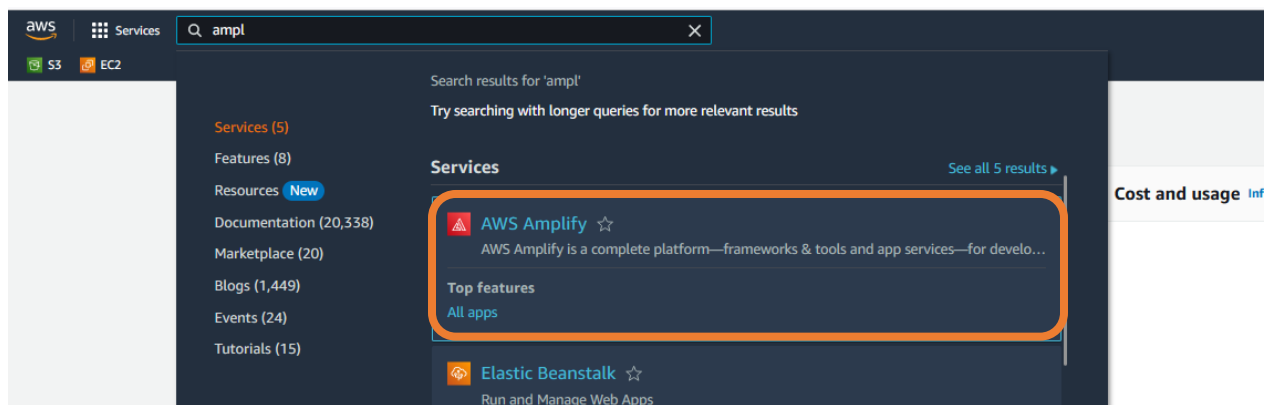
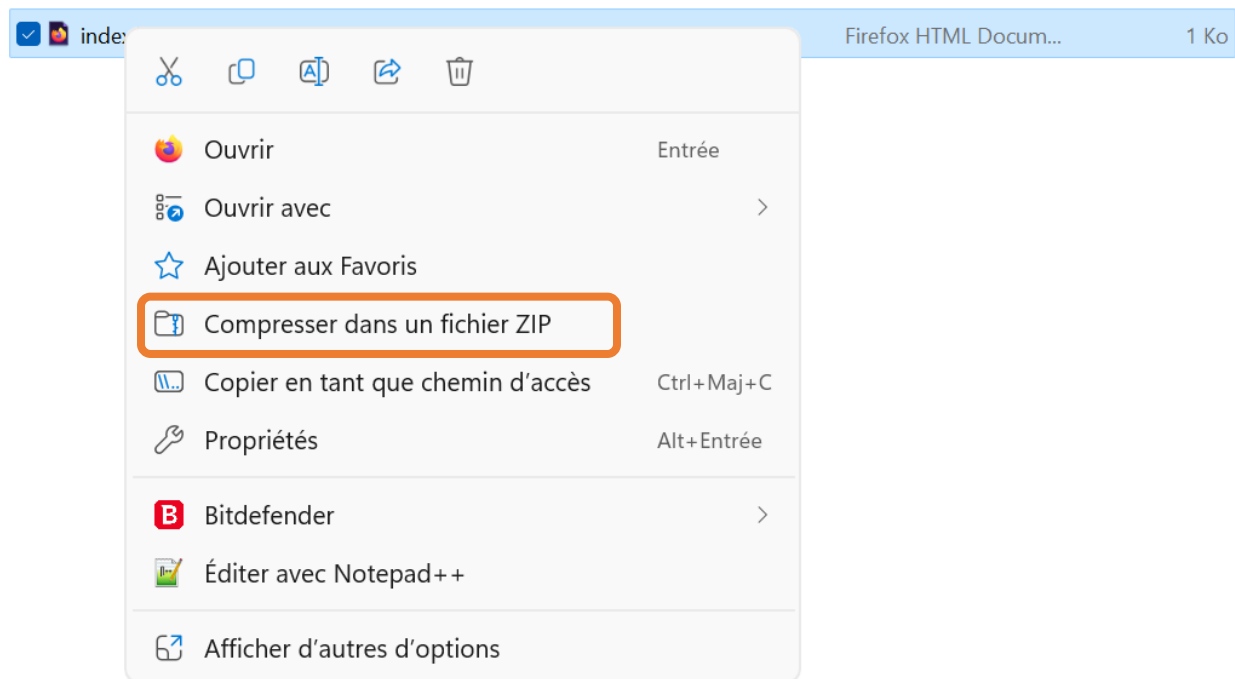
AWS
Identity & Access
Management (IAM)



Créer un fichier html

 Bonus++.docx	19/09/2023 09:15	Documen
<input checked="" type="checkbox"/>  index.html	19/09/2023 09:15	Fichier TX





AWS Amplify

Fastest, easiest way to develop mobile and web apps that scale.

GET STARTED



Amplify Studio



Build an app

Build an app backend with auth, data, and storage, and create custom UI components. Then integrate them in your app with just a few steps.



Get started

Amplify Hosting



Host your web app

Connect your Git repository to continuously deploy your frontend and backend. Host it on a globally available CDN.



Get started

Already have existing Cognito, S3, or other AWS resources? Connect to them from your app with the Amplify Libraries. [Go to docs](#)

Get started with Amplify Hosting

Amplify Hosting is a fully managed hosting service for web apps. Connect your repository to build, deploy, and host your web app.

From your existing code

Connect your source code from a Git repository or upload files to host a web app in minutes.

☐ GitHub



☐ Bitbucket



☐ GitLab



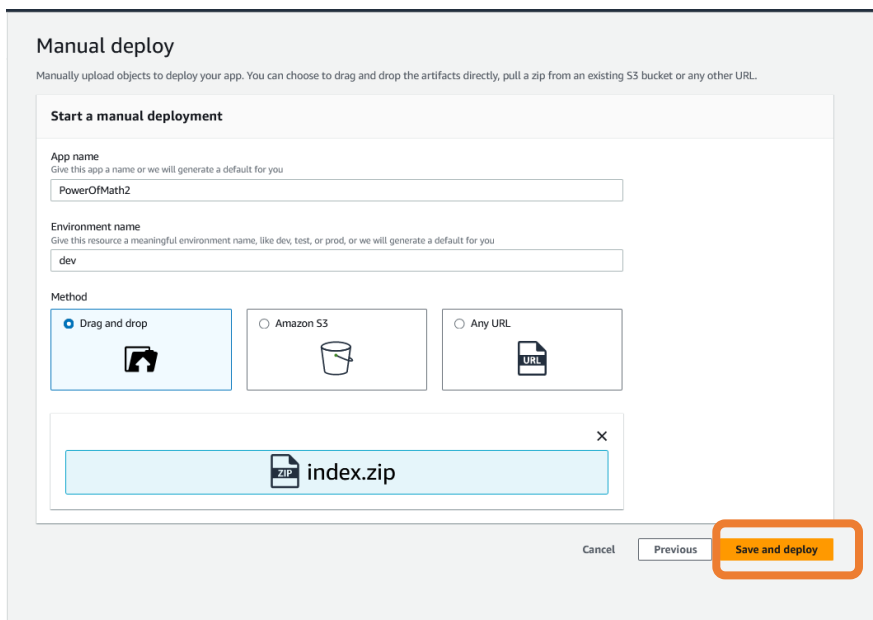
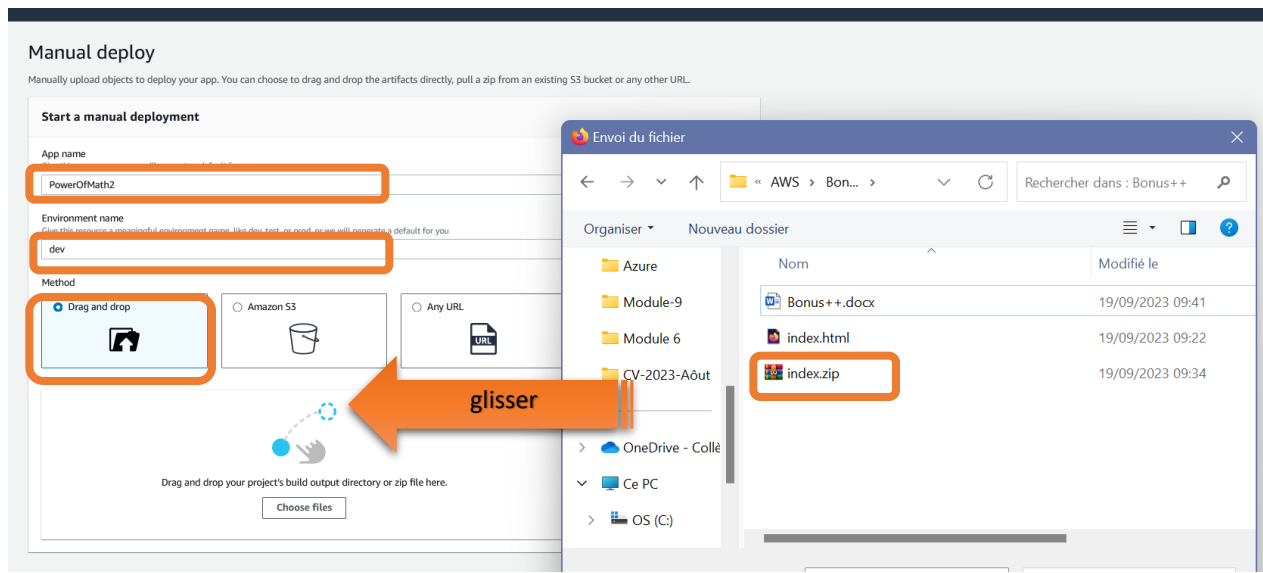
☐ AWS CodeCommit



☒ Deploy without Git provider



Continue



The app homepage lists all deployed frontend and backend environments.

Hosting environments Backend environments

This tab lists all connected branches, select a branch to view build details.

Add environment

dev



Deployment successfully completed.



Domain
<https://dev.d371aphd41wq5s.amplifyapp.com>

Last deployment
19/09/2023 09:45:38

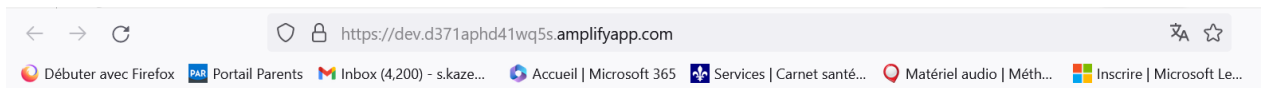


Drag and drop your project's build output directory or zip file here to update your app, or, [choose another method](#).

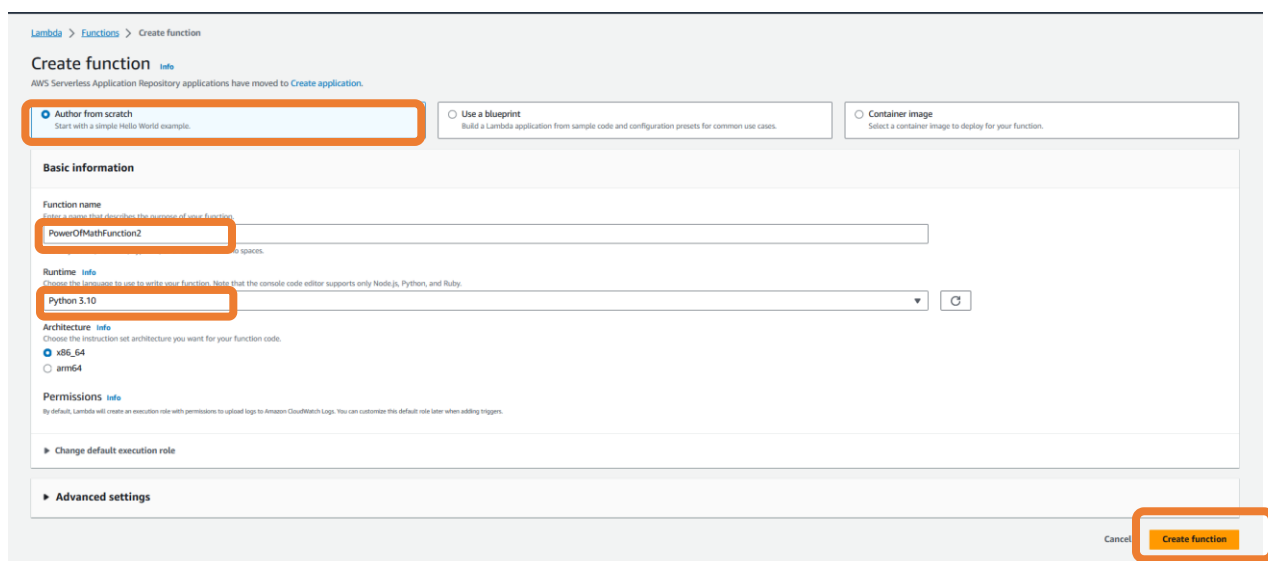
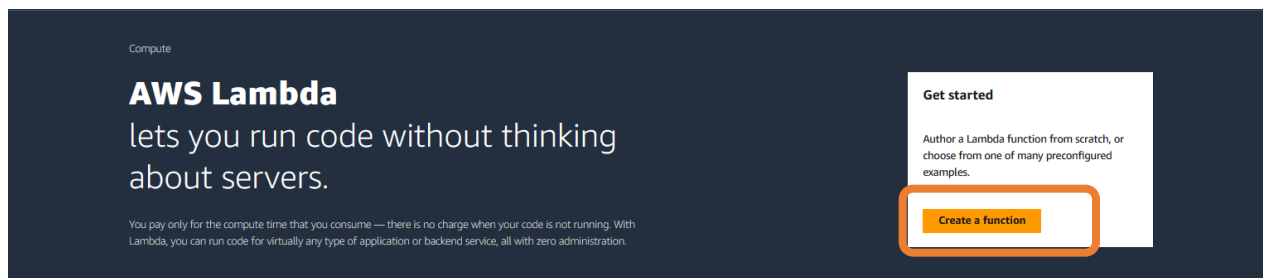
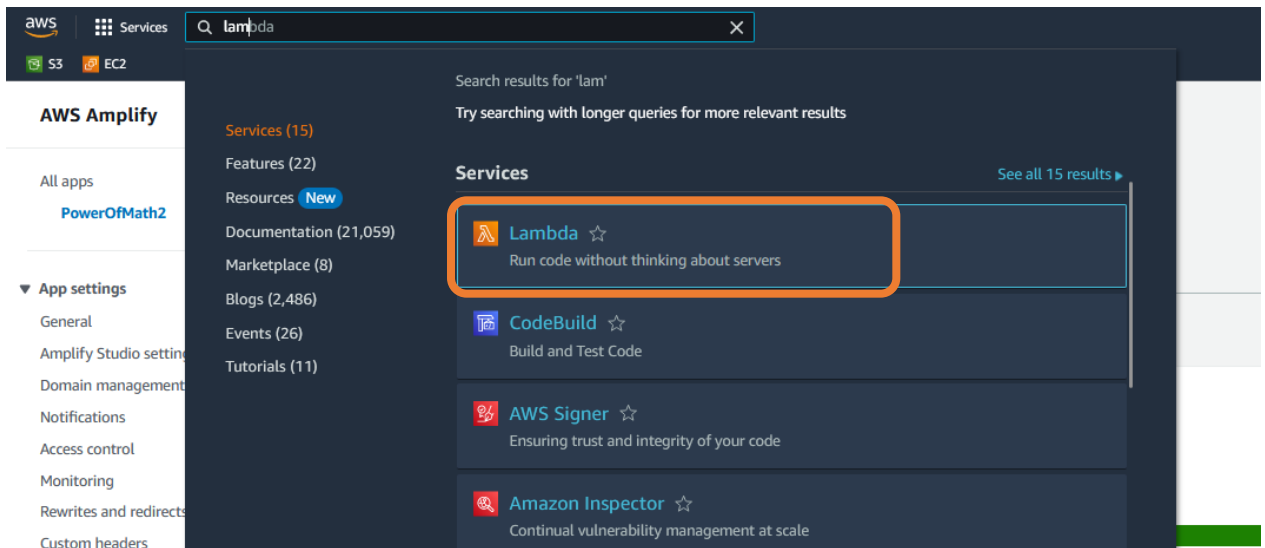
Choose files

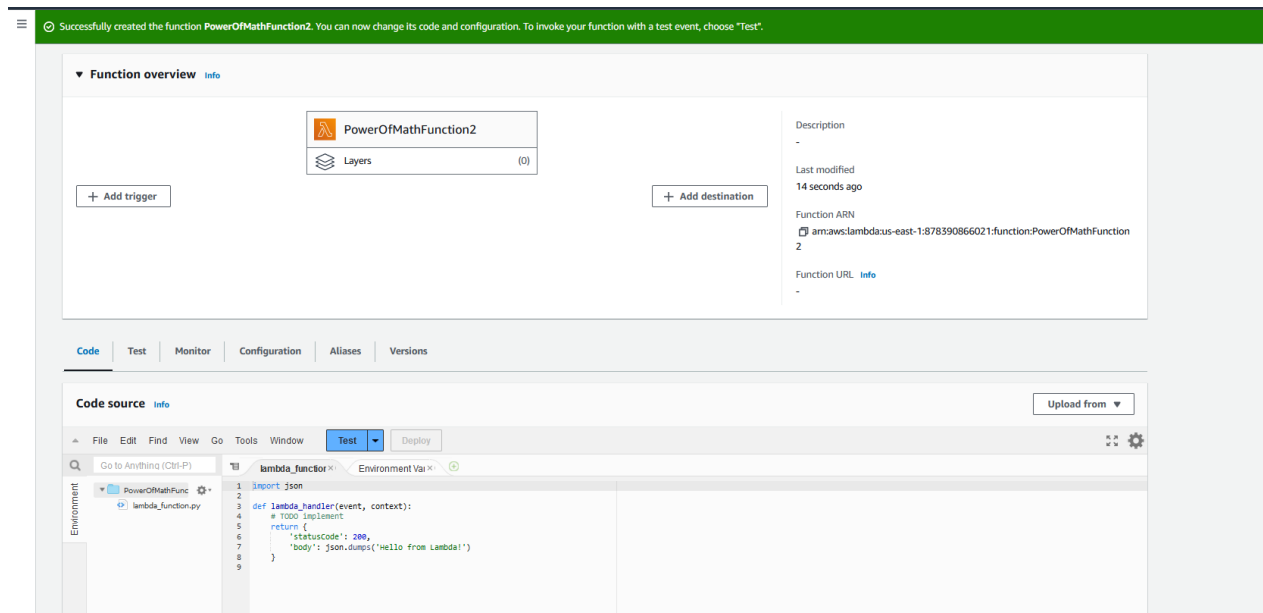
Domain

<https://dev.d371aphd41wq5s.amplifyapp.com>



To the Power of Math!





Copier ces commandes et coller

```
# import the JSON utility package
```

```
import json
```

```
# import the Python math library
```

```
import math
```

```
# define the handler function that the Lambda service will use as an entry point
```

```
def lambda_handler(event, context):
```

```
# extract the two numbers from the Lambda service's event object
```

```
    mathResult = math.pow(int(event['base']), int(event['exponent']))
```

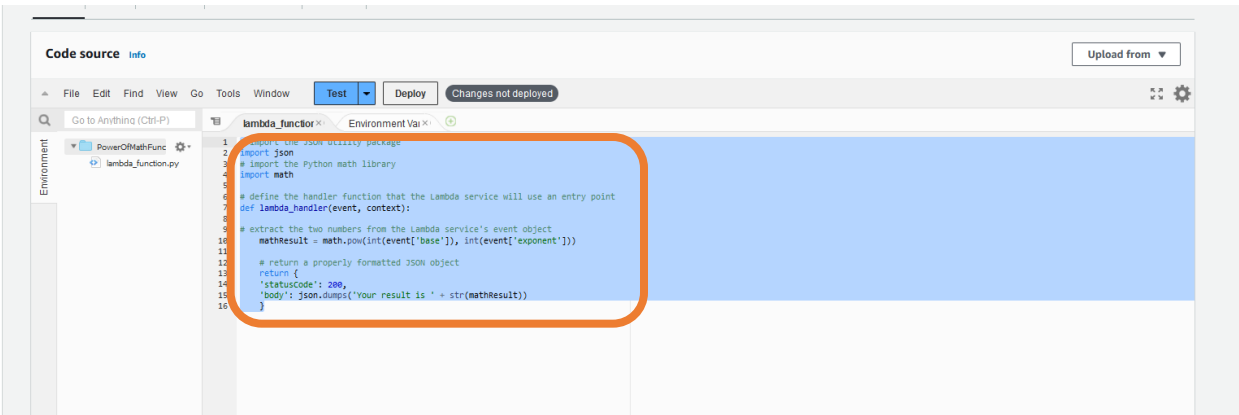
```
# return a properly formatted JSON object
```

```
    return {
```

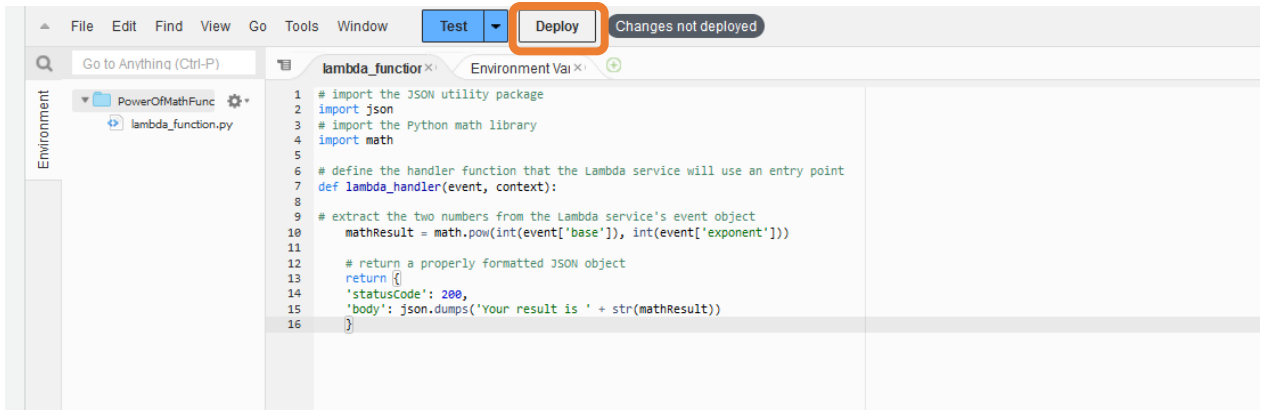
```
        'statusCode': 200,
```

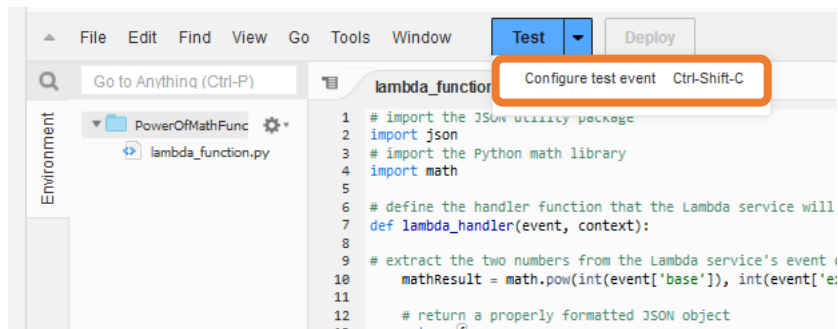
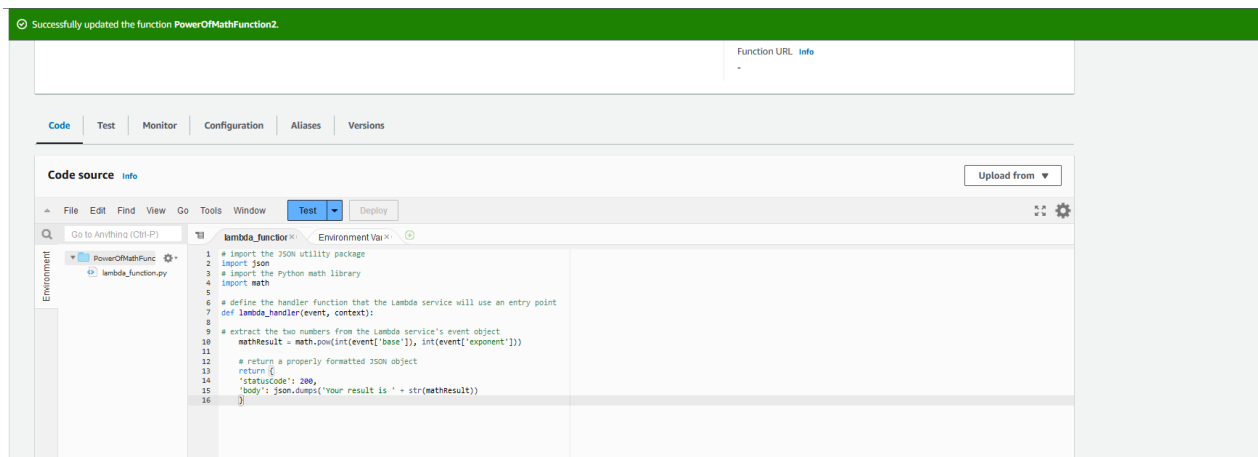
```
        'body': json.dumps('Your result is ' + str(mathResult))
```

```
    }
```



CTRL+S





Configure test event



A test event is a JSON object that mocks the structure of requests emitted by AWS services to invoke a Lambda function. Use it to see the function's invocation result.

To invoke your function without saving an event, configure the JSON event, then choose Test.

Test event action

☒ Create new event

☐ Edit saved event

Event name

PowerOfMathTestEvent2

Maximum of 25 characters consisting of letters, numbers, dots, hyphens and underscores.

Event sharing settings

☒ Private

This event is only available in the Lambda console and to the event creator. You can configure a total of 10. [Learn more](#)

☐ Shareable

This event is available to IAM users within the same account who have permissions to access and use shareable events. [Learn more](#)

Template - optional

hello-world

Event JSON

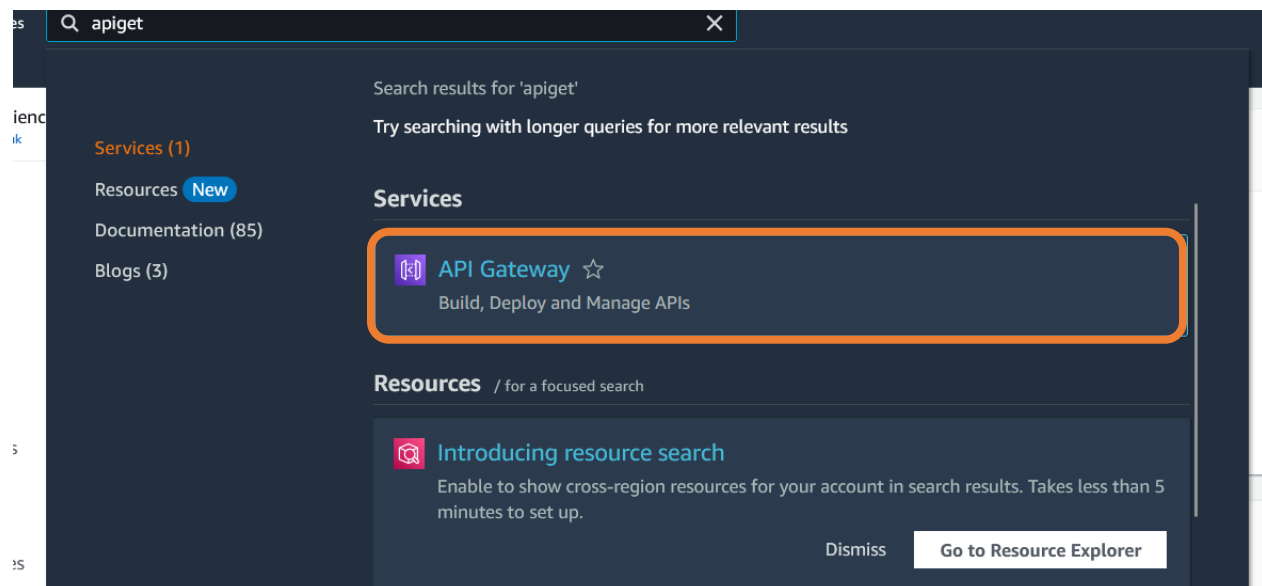
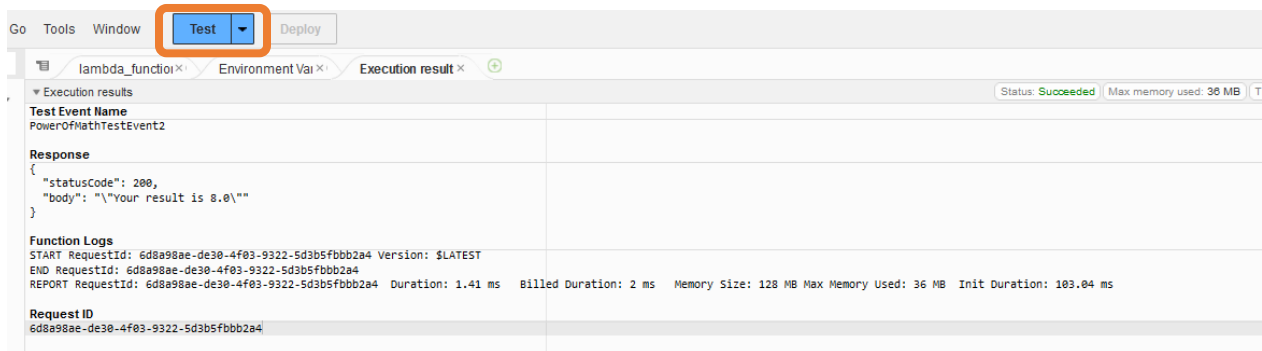
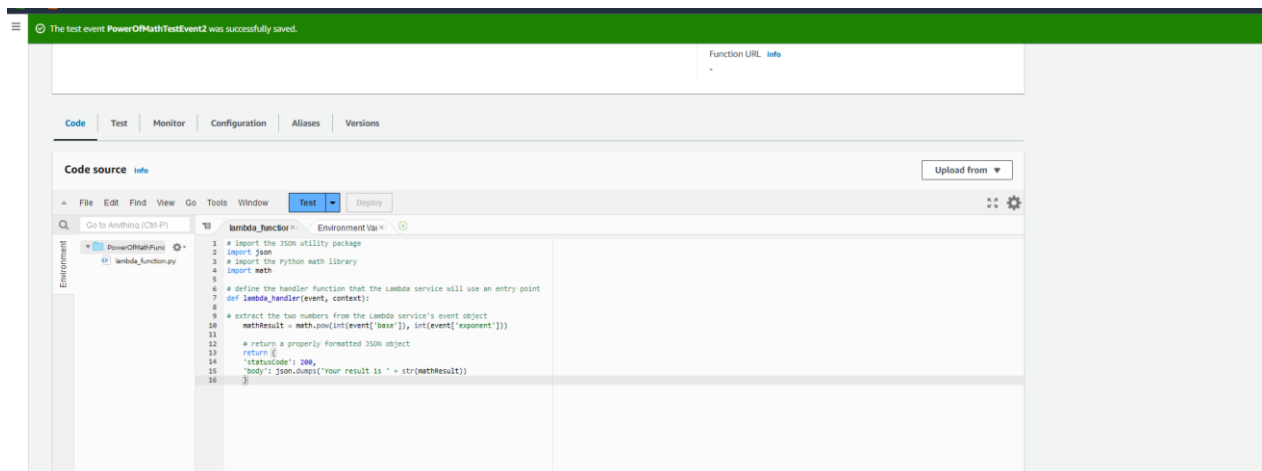
Format JSON

```
1 {  
2   "base": 2,  
3   "exponent": 3  
4 }  
5 }
```

Cancel

Invoke

Save



REST API


Develop a REST API where you gain complete control over the request and response along with API management capabilities.


Works with the following:

Lambda, HTTP, AWS Services

Import

Build

 Amazon API Gateway / REST / Create

 The new API Gateway console experience is now available. We've redesigned the API Gateway console to make it easier to use. [Try out the new console.](#) From 30th October 2023 the old console will no longer be available.

Choose the protocol

Select whether you want to create a REST API or a WebSocket API.

☒ REST ☐ WebSocket

Create new API

In Amazon API Gateway, a REST API refers to a collection of resources and methods that can be invoked through HTTPS endpoints.

☒ New API ☐ Import from Swagger or Open API 3 ☐ Example API

Settings

Choose a friendly name and description for your API.

API name*

Description

Endpoint Type ⓘ

* Required

[Create API](#)

Resources **Actions** / Methods

RESOURCE ACTIONS

- Create Method
- Create Resource
- Enable CORS
- Edit Resource Documentation

API ACTIONS

- Deploy API
- Import API
- Edit API Documentation
- Delete API

Resources

Actions

/ Methods

/

ANY

DELETE

GET

HEAD

OPTIONS

BATCH

POST

PUT

/

POST

/ - POST - Setup

Choose the integration point for your new method.

Integration type ☒ Lambda Function

- ☐ HTTP
- ☐ Mock
- ☐ AWS Service
- ☐ VPC Link

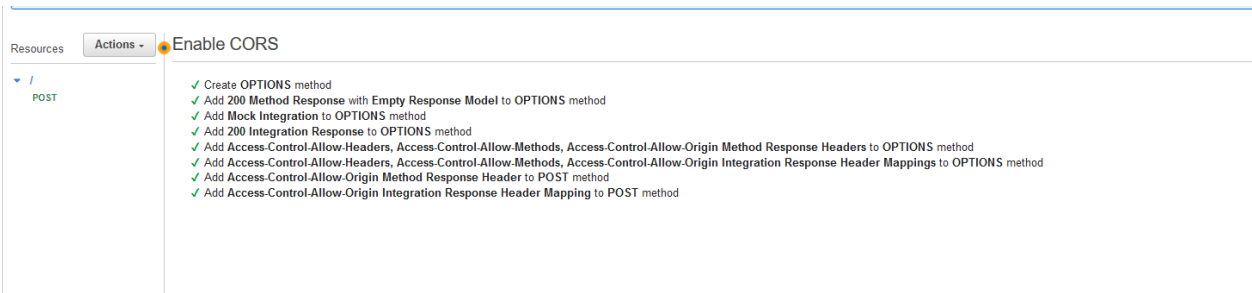
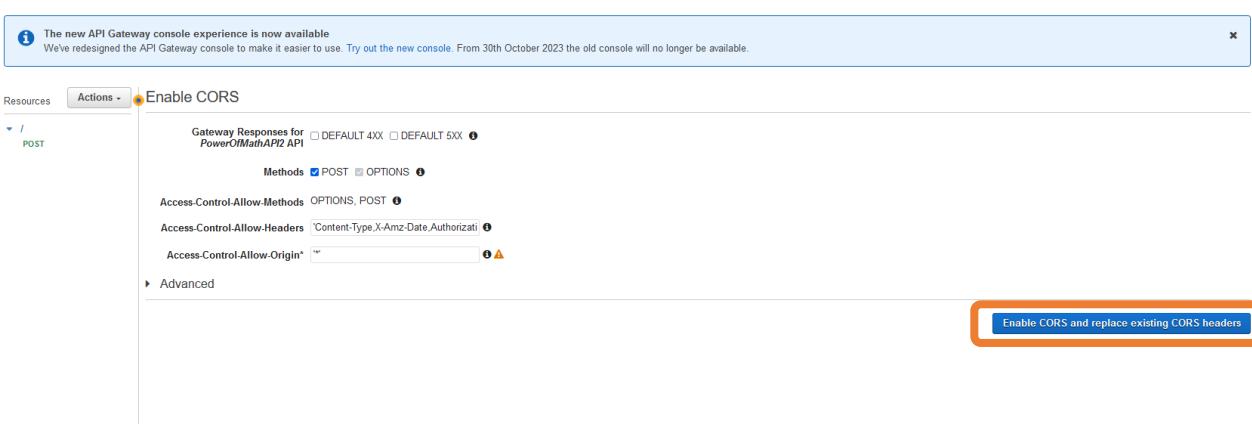
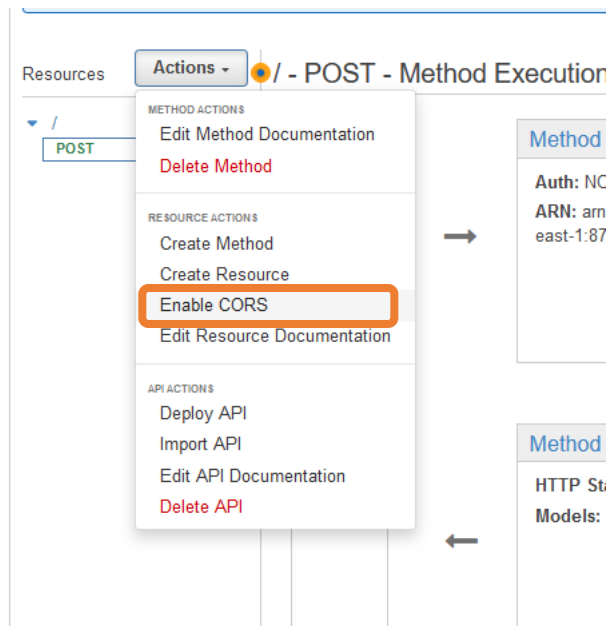
Use Lambda Proxy integration ☐

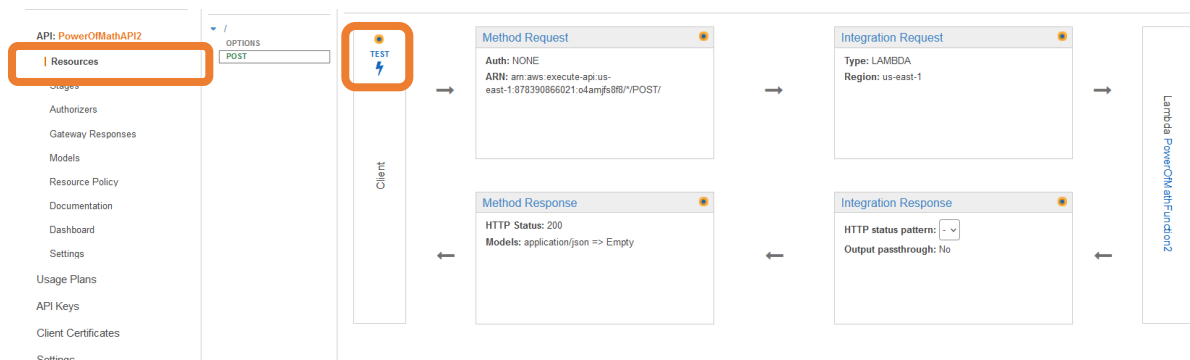
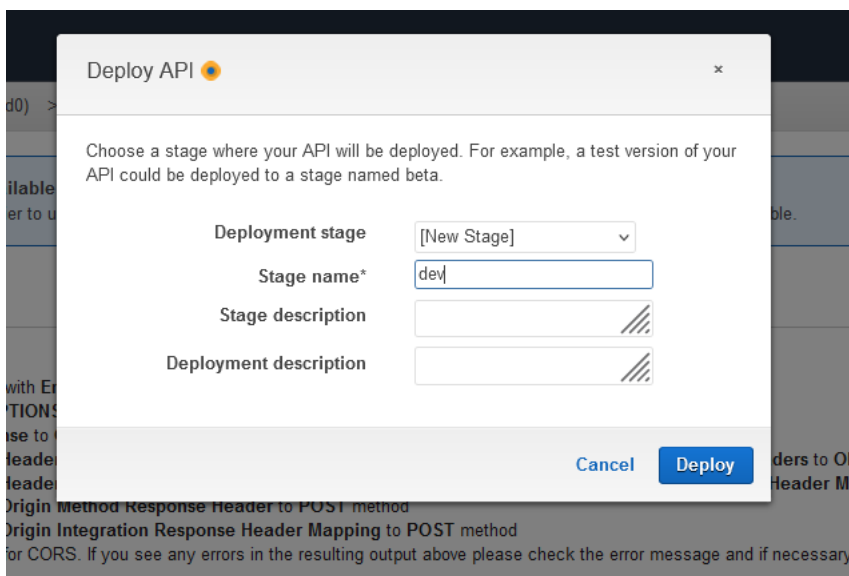
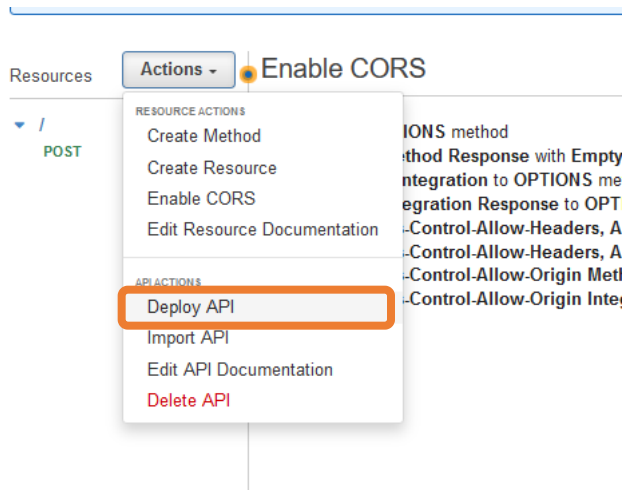
Lambda Region

Lambda Function

Use Default Timeout ☒

Save





Request.

Stage Variables

No [stage variables](#) exist for this method.

Request Body

```
1 {
2   "base":2,
3   "exponent":4
4 }
```

Test

Latency: 284 ms

Response Body

```
{"statusCode": 200, "body": "\\Your result is 16.0\\\"}"
```

Response Headers

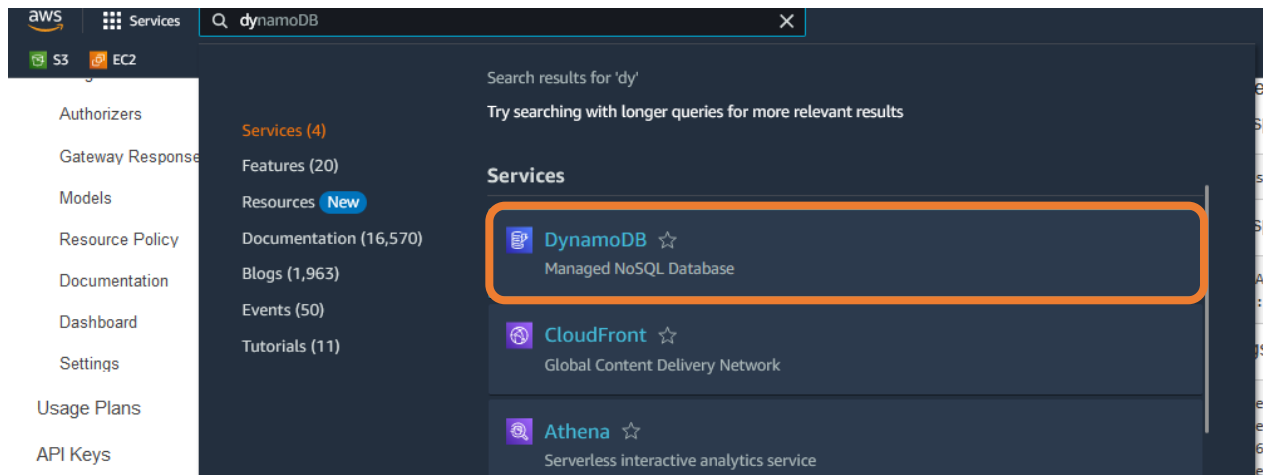
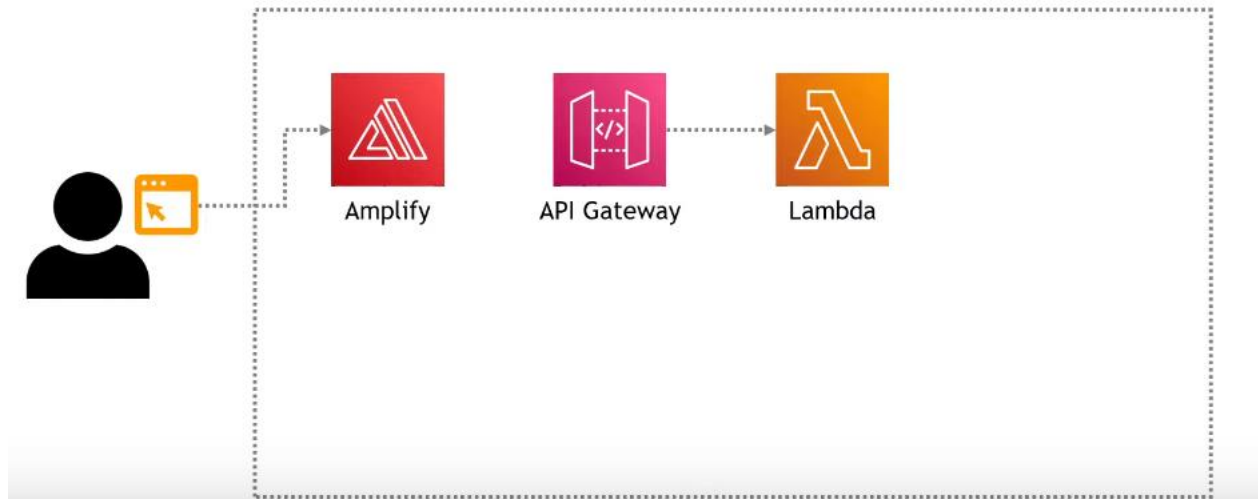
```
{"Access-Control-Allow-Origin":["*"],"Content-Type":["application/json"],"X-Amzn-Trace-Id":["Root=1-6509c766-f1a4988dae6a3b8e238e5c7b;Sampled=0;lineage=fdcb669e:0"]}
```

Logs

```
Execution log for request 7395469f-77ae-4b47-88ba-27a65f354b62
Tue Sep 19 16:08:06 UTC 2023 : Starting execution for request: 7395469f-77ae-4b47-88ba-27a65f354b62
Tue Sep 19 16:08:06 UTC 2023 : HTTP Method: POST, Resource Path: /
Tue Sep 19 16:08:06 UTC 2023 : Method request path: {}
Tue Sep 19 16:08:06 UTC 2023 : Method request query string: {}
Tue Sep 19 16:08:06 UTC 2023 : Method request headers: {}
Tue Sep 19 16:08:06 UTC 2023 : Method request body before transformations: {
  "base":2,
  "exponent":4
}
Tue Sep 19 16:08:06 UTC 2023 : Endpoint request URI: https://lambda.us-east-1.amazonaws.com/2015-03-31/functions/arn:aws:lambda:us-east-1:878390866021:function:PowerOfMathFunction2/invocations
Tue Sep 19 16:08:06 UTC 2023 : Endpoint request headers: {X-Amz-Date=20230919T160806Z, x-amzn-apigateway-api-id=o4amjfs8f8, Accept=application/json, User-Agent=AmazonAPIGateway_o4amjfs8f8, Host=lambda.us-east-1.amazonaws.com, X-Amz-Content-Sha256=be079c8df771e7f9993daa507c3816bdd48acffca3d81607e2bccce3bcdce536, X-Amzn-Trace-Id=Root=1-6509c766-f1a4988dae6a3b8e238e5c7b, x-amzn-lambda-integration-tag=7395469f-77ae-4b47-88ba-27a65f354b62, Authorization=*****80696f, X-Amz-Source-Arn=arn:aws:execute-api:us-east-1:878390866021:o4amjfs8f8/test-invoke-stage/POST/, X-Amz-Security-Token=IQoJb3JpZ2luX2VjENj////////wEaCXVzLWVhc3QtMSJHMEUCIDouBdQhjuU06CnMiAWCbW0LcVp2YpED3MXIw8slstvnAiEAroKimgK6p4/HKM/TK7inpMdoJnxnKxk/pzcOg52BiRUq[TRUNCATED]
Tue Sep 19 16:08:06 UTC 2023 : Endpoint request body after transformations: {
  "base":2,
  "exponent":4
}
Tue Sep 19 16:08:06 UTC 2023 : Sending request to https://lambda.us-east-1.amazonaws.com/2015-03-31/functions/arn:aws:lambda:us-east-1:878390866021:function:PowerOfMathFunction2/invocations
```



The Current Architecture



Database

Amazon DynamoDB

A fast and flexible NoSQL database service for any scale

DynamoDB is a fully managed, key-value, and document database that delivers single-digit-millisecond performance at any scale.

Get started

Create a new table to start exploring DynamoDB.

Create table

DynamoDB > Tables > Create table

Create table

Table details [Info](#)

DynamoDB is a schemaless database that requires only a table name and a primary key when you create the table.

Table name

This will be used to identify your table.

PowerOfMathDatabase2

Between 2 and 255 characters, containing only letters, numbers, underscores (_), hyphens (-), and periods (.).

Partition key

The partition key is part of the table's primary key. It is a hash value that is used to retrieve items from your table and allocate data across nodes for availability and scalability.

ID

String

1 to 255 characters and case sensitive.

Sort key - optional

You can use a sort key as the second part of a table's primary key. The sort key allows you to sort or search among all items sharing the same partition key.

Enter the sort key name

String

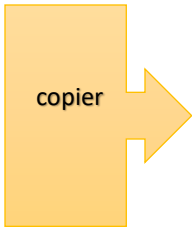
1 to 255 characters and case sensitive.

Cancel

Create table

The PowerOfMathDatabase2 table was created successfully.

Tables (1) Info									
	Find tables by table name	Any tag key	Any tag value						
<input type="checkbox"/>	PowerOfMathDatabase2	Active	ID (S)	-	0	0 MB	Provisioned with auto scaling (S)	Provisioned with auto scaling (S)	0 bytes



Amazon Resource Name (ARN)


 `arn:aws:dynamodb:us-east-1:878390866021:table/PowerOfMathDatabase2`


[Lambda](#) > [Functions](#) > PowerOfMathFunction2

PowerOfMathFunction2

[Throttle](#) [Copy ARN](#) [Actions](#)

Function overview [Info](#)

 **PowerOfMathFunction2**

 Layers (0)

[+ Add trigger](#)

[+ Add destination](#)

Description

Last modified: 1 hour ago

Function ARN: [arn:aws:lambda:us-east-1:878390866021:function:PowerOfMathFunction2](#)

Function URL: [Info](#)

[Code](#) [Test](#) [Monitor](#) **[Configuration](#)** [Aliases](#) [Versions](#)

General configuration

[Triggers](#)

[Permissions](#)

[Destinations](#)

[Function URL](#)

[Environment variables](#)

[Tags](#)

[VPC](#)

[Monitoring and operations tools](#)

[Concurrency](#)

[Asynchronous invocation](#)

[Code signing](#)

[Database proxies](#)

[File systems](#)


[State machines](#)

Execution role

[Refresh](#) [Edit](#) [View role document](#)

Role name: [PowerOfMathFunction2-role-yuj67xyn](#)

Resource summary

 Amazon CloudWatch Logs
3 actions, 2 resources

To view the resources and actions that your function has permission to access, choose a service.

[By action](#) [By resource](#)

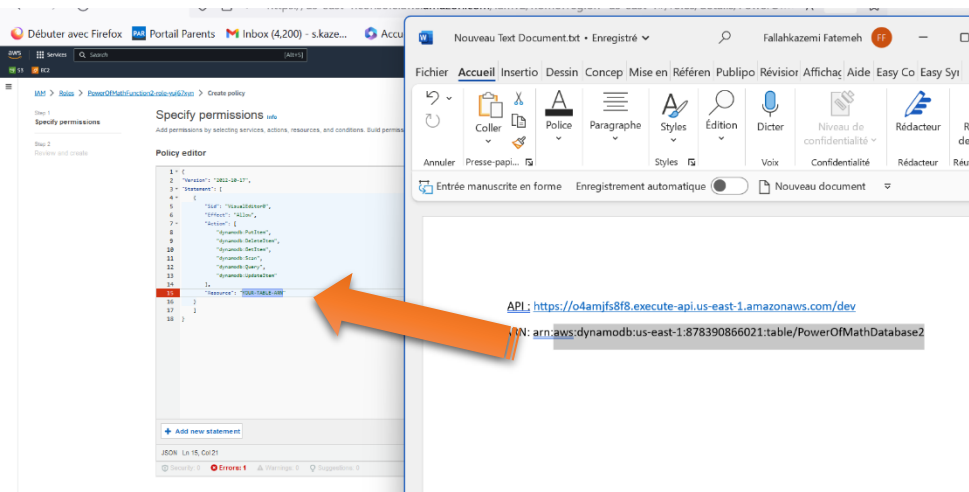
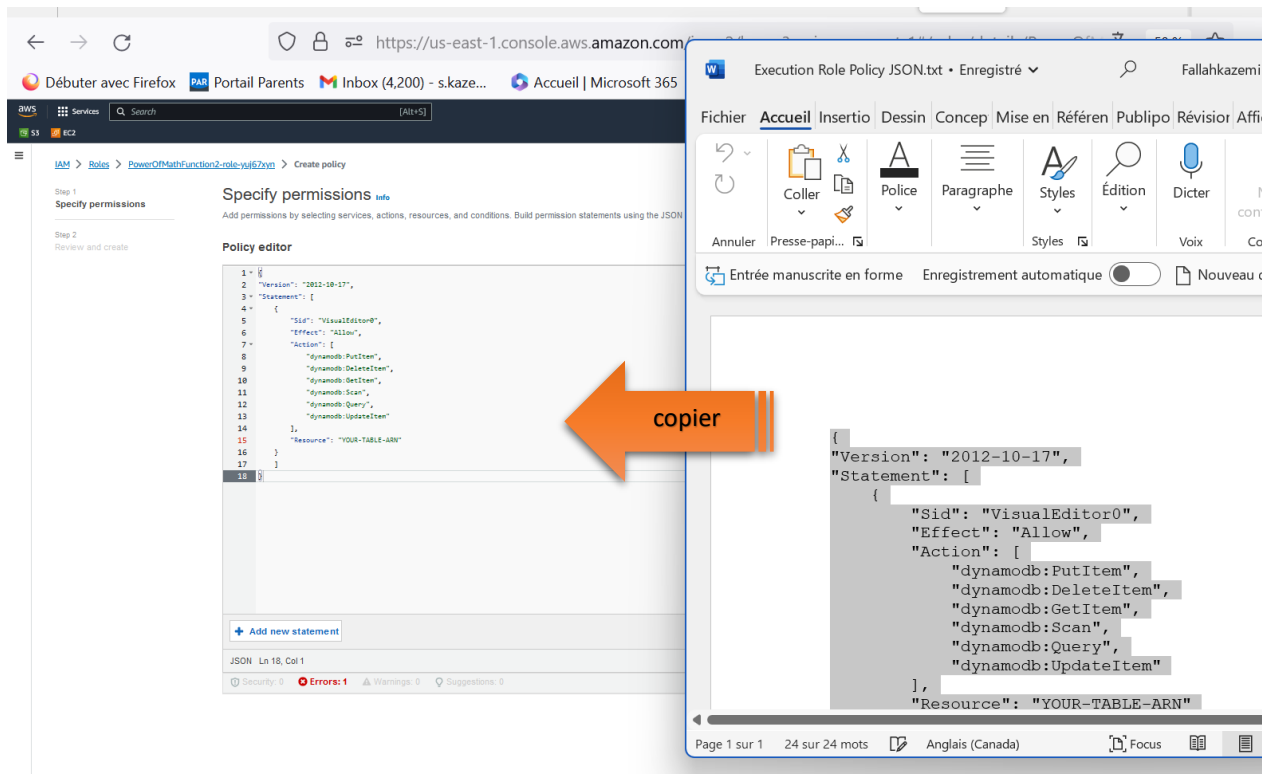
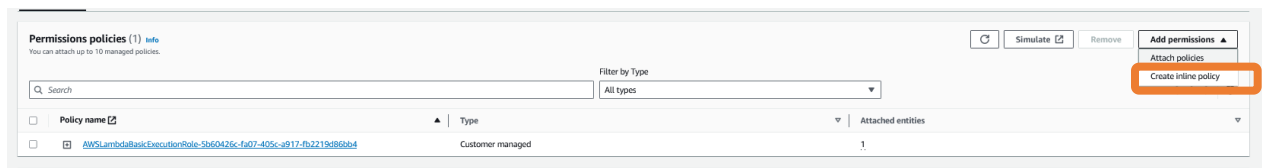
Resource	Actions
arn:aws:logs:us-east-1:878390866021:*	Allow: logs:CreateLogGroup
arn:aws:logs:us-east-1:878390866021:log-group:/aws/lambda/PowerOfMathFunction2:*	Allow: logs:CreateLogStream Allow: logs:PutLogEvents

[Info](#) Lambda obtained this information from the following policy statements:

- Managed policy AWSLambdaBasicExecutionRole-5b60426c-fa07-405c-a917-fb2219d86bb4, statement 0
- Managed policy AWSLambdaBasicExecutionRole-5b60426c-fa07-405c-a917-fb2219d86bb4, statement 1

Resource-based policy statements (1) [Info](#)

[Refresh](#) [View policy](#) [Edit](#) [Delete](#) [Add permissions](#)



Review the permissions, specify details, and tags.

Policy name
Enter a meaningful name to identify this policy.

Maximum 128 characters. Use alphanumeric and '+,.,@,-_' characters.

Permissions in the policy document specify which actions are allowed or denied.

Q Search

Allow (1 of 385 services)

☐ Show remaining 384 services

Service	Access level	Resource	Request condition
DynamoDB	Limited Read, Write	region string like us-east-1, TableName string like PowerOf10MathDatabase2	None

Cancel Previous **Create policy**

[Permissions](#)
[Trust relationships](#)
[Tags](#)
[Access Advisor](#)
[Revoke sessions](#)

Permissions policies (2) [info](#)

You can attach up to 10 managed policies.

Filter by type

All types

🔄

Simulate

Remove

Add permissions

< 1 >

⌕

<input type="checkbox"/>	Policy name	Type	Attached entities
<input checked="" type="checkbox"/>	AWSLambdaBasicExecutionRole-Sb60426c-fb07-405c-g917-fb2219-b86b4	Customer managed	1
<input type="checkbox"/>	PowerOfMathology	Customer inline	0


The test event **PowerOfMathTestEvent2** was successfully saved.


Lambda > Functions > PowerOfMathFunction2

PowerOfMathFunction2

Throttle Copy ARN Actions

▼ Function overview Info

 PowerOfMathFunction2

 Layers (0)

+ Add trigger

+ Add destination


Description

-

Last modified

3 hours ago

Function ARN

 arn:aws:lambda:us-east-1:878390866021:function:PowerOfMathFunction2

Function URL [Info](#)

-

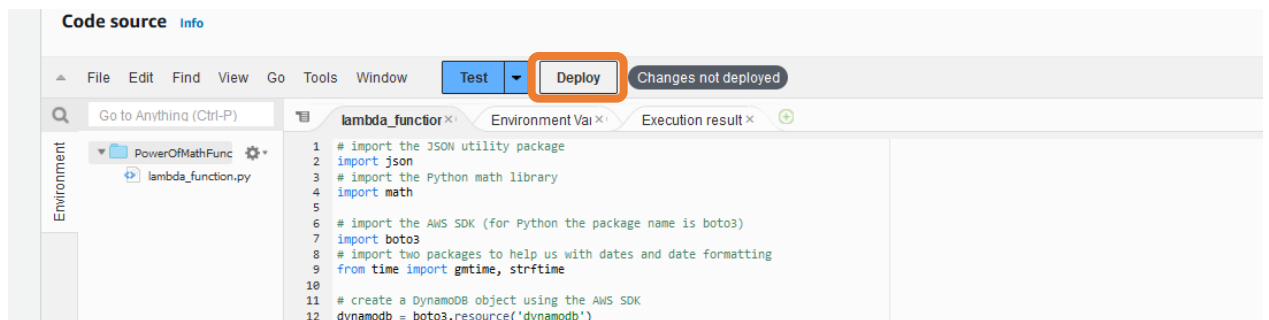
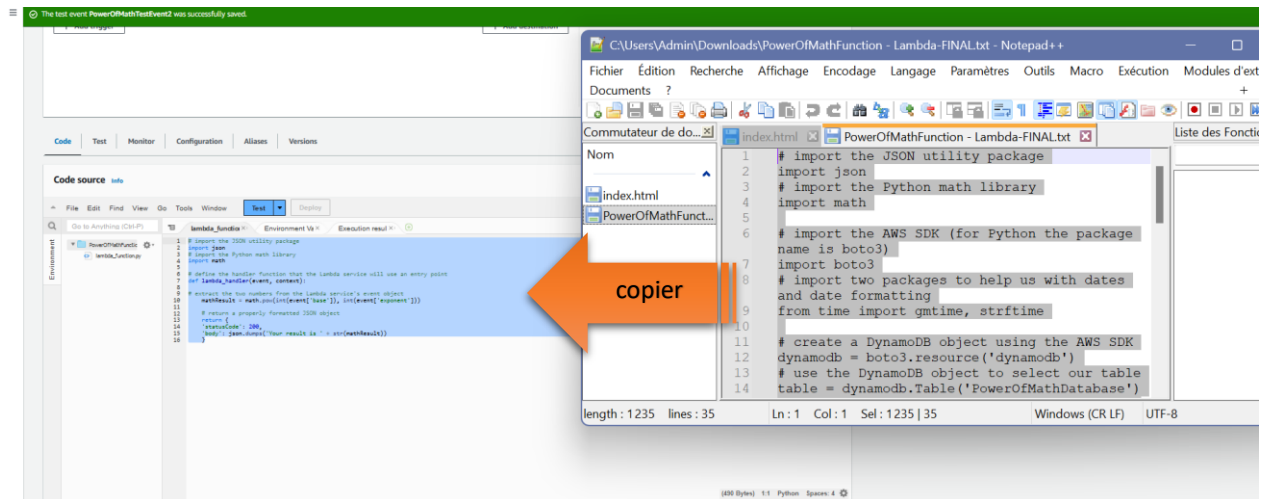
Code Test Monitor **Configuration** Aliases Versions

General configuration

Execution role

Triggers

Copy Edit View role document



Dashboard

Tables

Update settings

Explore items

PartiQL editor

Backups

Exports to S3

Imports from S3

Reserved capacity

Settings

DynamoDB > Tables > PowerOfMathDatabase2

Tables (1)

Any tag key

Any tag value

Find tables by table name

PowerOfMathDatabase2

PowerOfMathDatabase2

Overview | Indexes | Monitor | Global tables | Backups | Exports and streams | Additional settings

Protect your DynamoDB table from accidental writes and deletes

When you turn on point-in-time recovery (PITR), DynamoDB backs up your table data automatically so that you can restore to any given second in the preceding 35 days. Additional charges apply. [Learn more](#)

Edit PITR

General information

Actions

Explore table items

athDatabase2

PowerOfMathDatabase2

Autopreview

View table details

▼ Scan or query items

Scan

Query

Select a table or index

Table - PowerOfMathDatabase2

Select attribute projection

All attributes

► Filters

Run

Reset

Completed. Read capacity units consumed: 0.5

Items returned (1)

Actions

Create item

ID (String)

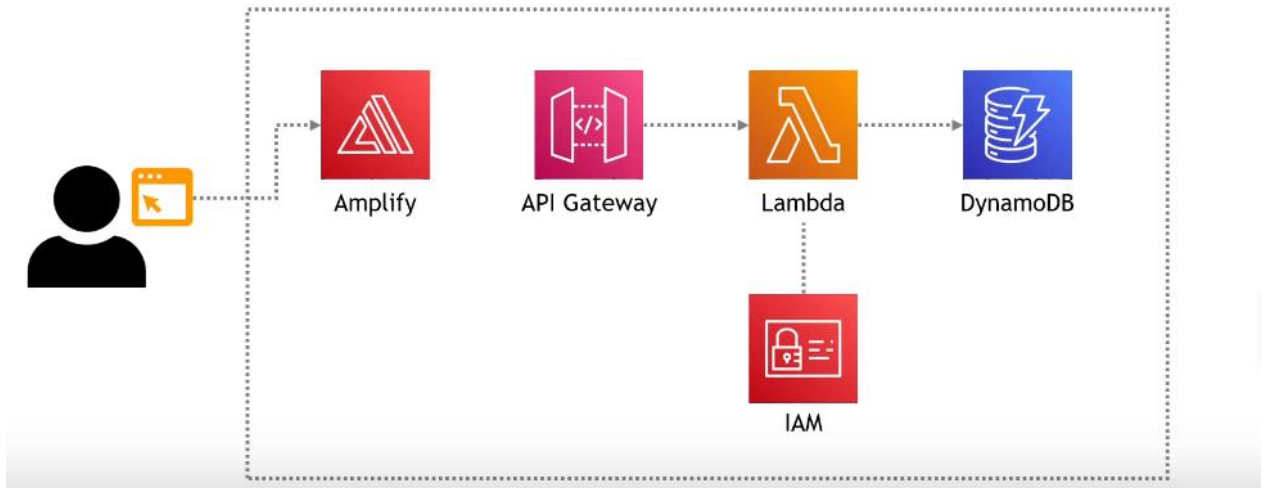
LatestGreetingTime

8.0

Tue, 19 Sep 2023 16:50:32 +0000



The Current Architecture



The screenshot shows a code editor with the following JavaScript code for a Lambda function:

```
34 input {
35   color: #222629;
36   font-family: system-ui;
37   font-size: 20px;
38   margin-left: 10px;
39   margin-top: 20px;
40   width: 100px;
41 }
42 </style>
43 <script>
44 // callAPI function that takes the base and
45 var callAPI = (base,exponent)=>{
46   // instantiate a headers object
47   var myHeaders = new Headers();
48   // add content type header to object
49   myHeaders.append("Content-Type", "appli
50 // using built in JSON utility package
51 var raw = JSON.stringify({"base":base,"
52 // create a JSON object with parameters
53 var requestOptions = {
54   method: 'POST',
55   headers: myHeaders,
56   body: raw,
57   redirect: 'follow'
58 };
59 // make API call with parameters
60 fetch("YOUR API GATEWAY ENDPOINT", {
61   .then(response => response.text())
62   .then(result => alert(JSON.parse(result
63   .catch(error => console.log('error', er
64 }
65 </script>
66 </head>
67 <body>
68 <h1>TO THE POWER OF MATH!</h1>
69 <form>
70   <label>Base number:</label>
71   <input type="text" id="base">
72   <label>...to the power of:</label>
```

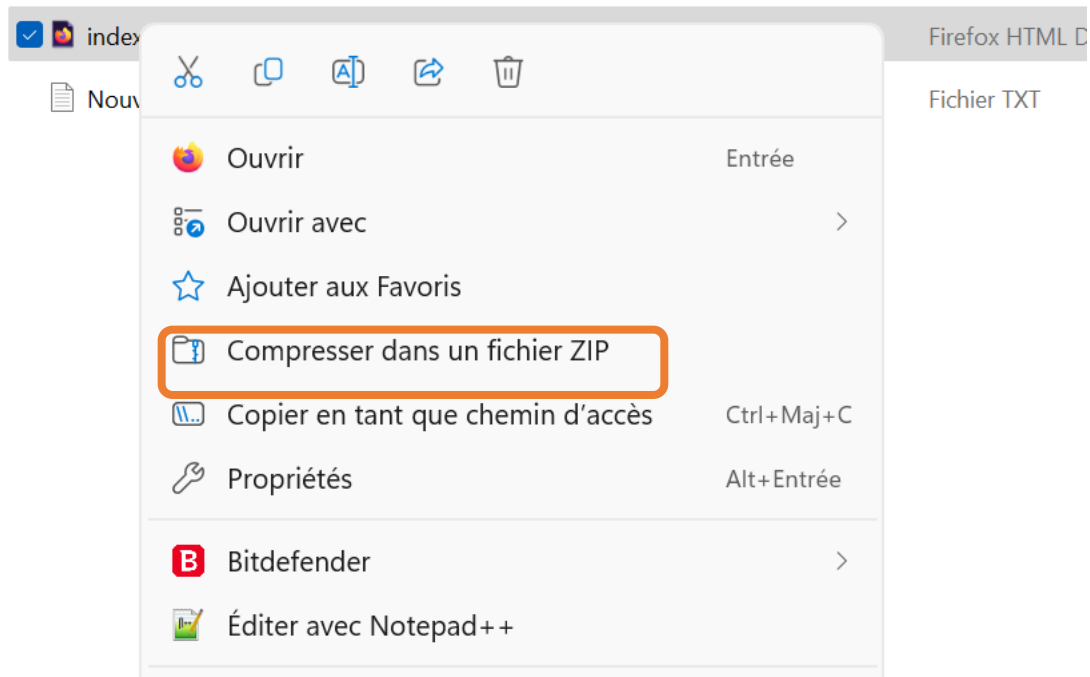
The Microsoft Word document (Nouveau Text Document.txt) shows the following text:

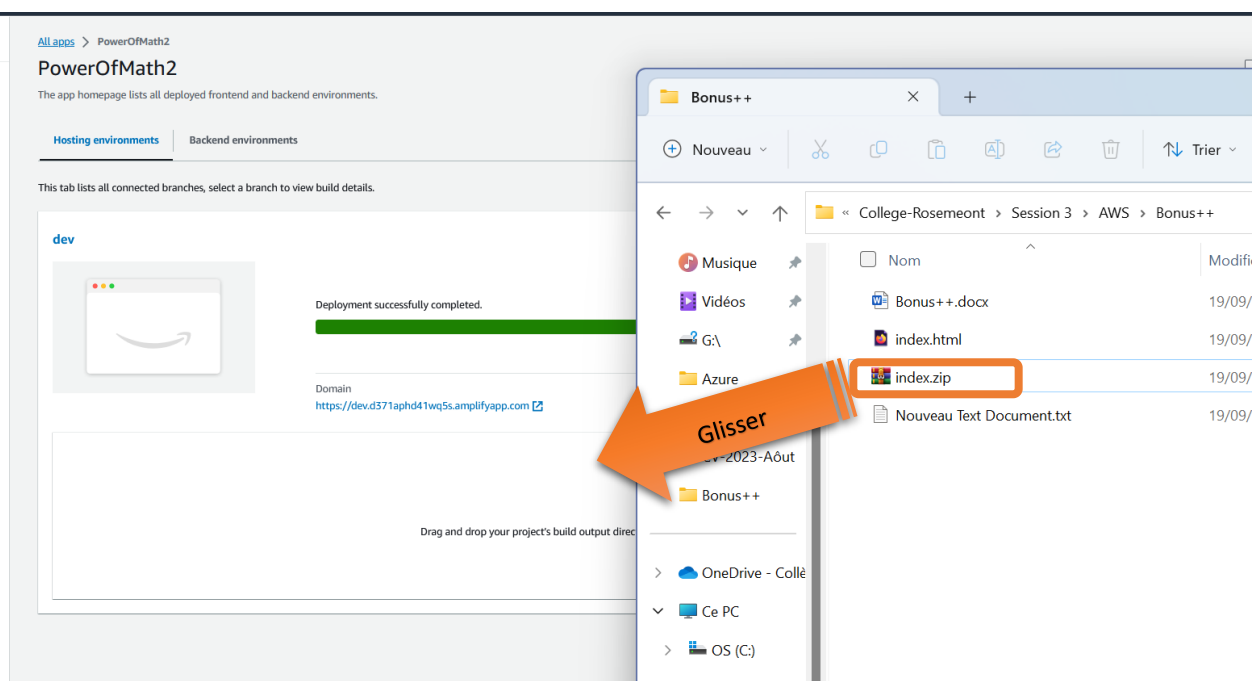
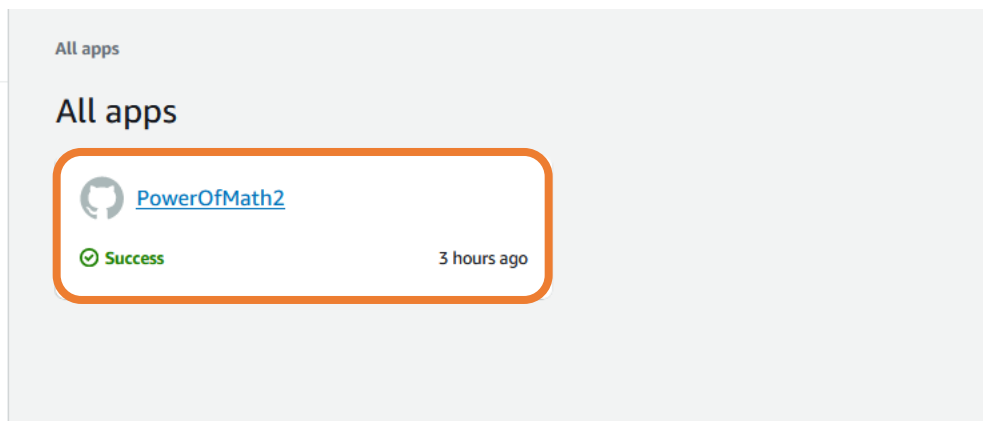
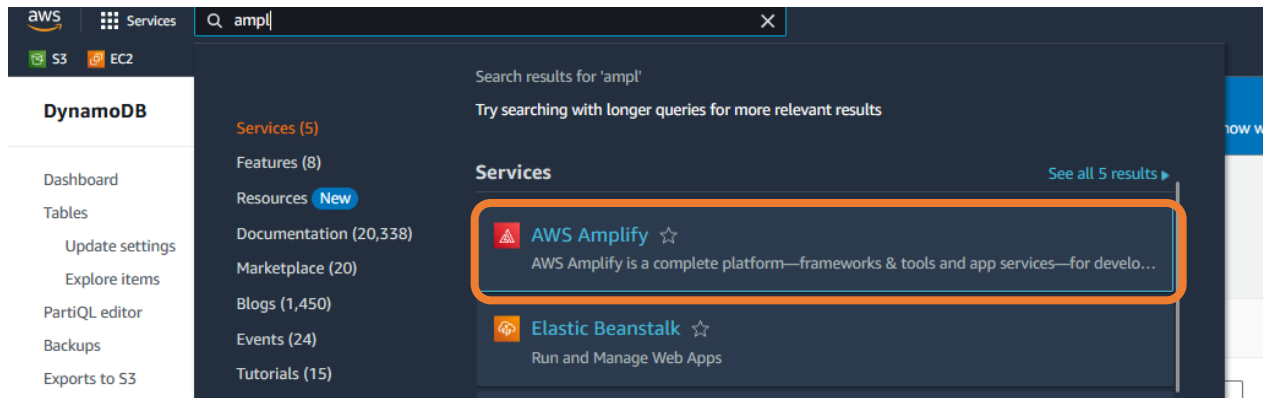
API: <https://o4amjfs8f8.execute-api.us-east-1.amazonaws.com/dev>

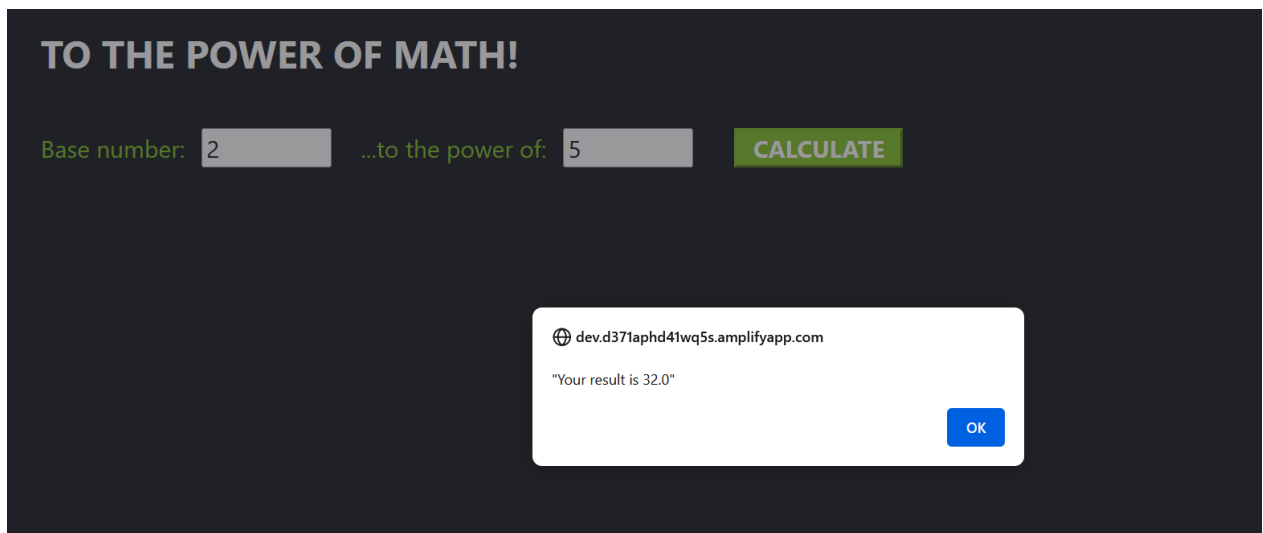
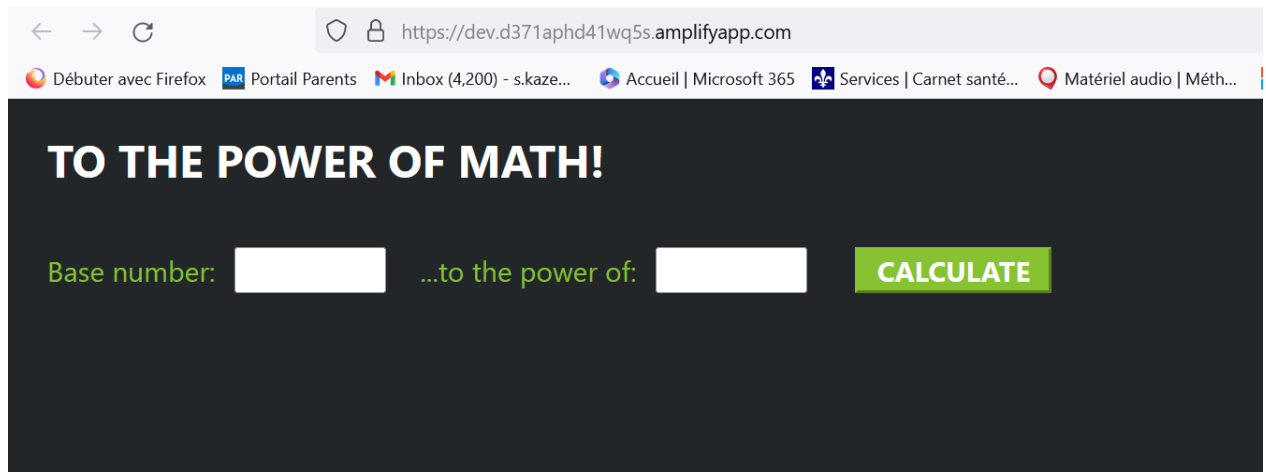
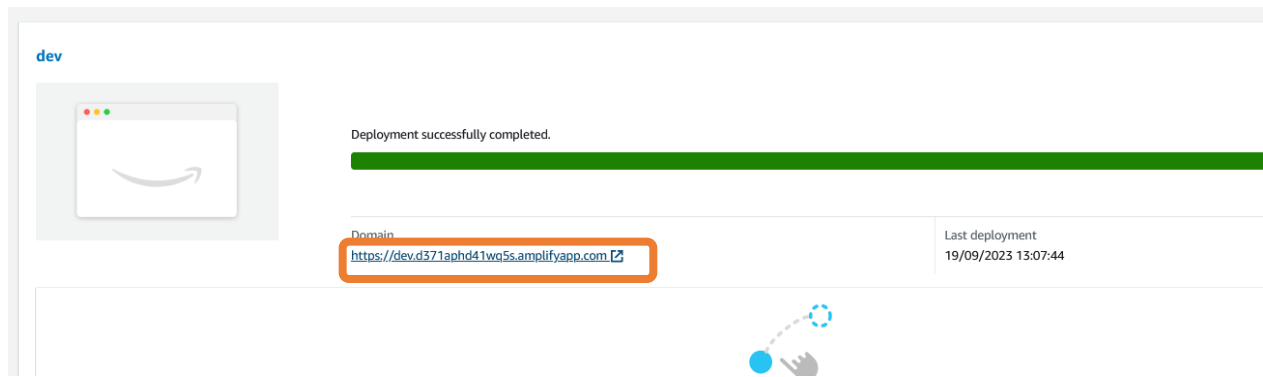
ARN: <arn:aws:dynamodb:us-east-1:878390866021:table/PowerOfMathDatabase2>

An orange arrow labeled "copier" points from the API URL in the Word document to the code editor.

```
index.html | PowerOfMathFunction - Lambda-FINAL.txt | index(1).html
34
35   input {
36     color: #222629;
37     font-family: system-ui;
38     font-size: 20px;
39     margin-left: 10px;
40     margin-top: 20px;
41     width: 100px;
42   }
43 </style>
44 <script>
45   // callAPI function that takes the base and exponent numbers as parameters
46   var callAPI = (base,exponent)=>{
47     // instantiate a headers object
48     var myHeaders = new Headers();
49     // add content type header to object
50     myHeaders.append("Content-Type", "application/json");
51     // using built in JSON utility package turn object to string and store in a variable
52     var raw = JSON.stringify({"base":base,"exponent":exponent});
53     // create a JSON object with parameters for API call and store in a variable
54     var requestOptions = {
55       method: 'POST',
56       headers: myHeaders,
57       body: raw,
58       redirect: 'follow'
59     };
60     // make API call with parameters and use promises to get response
61     fetch("https://o4amjfs8f8.execute-api.us-east-1.amazonaws.com/dev", requestOptions)
62     .then(response => response.text())
63     .then(result => alert(JSON.parse(result).body))
64     .catch(error => console.log('error', error));
65   }
66 </script>
67 </head>
68 <body>
69   <h1>TO THE POWER OF MATH!</h1>
70   <form>
71     <label>Base number:</label>
72     <input type="text" id="base">
73     <label>...to the power of:</label>
74     <input type="text" id="exponent">
75     <!-- set button onClick method to call function we defined passing input values as parameters -->
```









▼ Scan or query items

☒ Scan ☐ Query

Select a table or index
Table - PowerOfMathDatabase2 ▼

Select attribute projection
All attributes ▼

► Filters

Run Reset

✔ Completed. Read capacity units consumed: 0.5 ✕

Items returned (1)

🔄 Actions ▼ Create item

< 1 > 📄 🖨

<input type="checkbox"/>	ID (String) ▼	LatestGreetingTime
<input type="checkbox"/>	8.0	Tue, 19 Sep 2023 16:50:32 +0000

SHUT DOWN
YOUR
RESOURCES!

All apps > PowerOfMath2


PowerOfMath2

The app homepage lists all deployed frontend and backend environments.

[Hosting environments](#) Backend environments

This tab lists all connected branches, select a branch to view build details.

dev



Deployment successfully completed.

100%

Actions

- View app settings
- Delete app

Add environment

Delete your app

To confirm this deletion type "delete" in the field.

Cancel Delete

DynamoDB

Share your feedback on Amazon DynamoDB

DynamoDB > Tables

Tables (1/1) info

Find tables by table name

Any tag key Any tag value

Actions Delete Create table

Name	Status	Partition key	Sort key	Indexes	Deletion protection	Read capacity mode	Write capacity mode	Total size	Table class
PowerOfMathDatabase2	Active	ID (S)	-	0	Off	Provisioned with auto scaling (1)	Provisioned with auto scaling (1)	0 bytes	Standard

itted successfully.

Tables (1/1) info

Find tables by table name

Any tag key Any tag value

Actions Delete Create table

Partition key	Sort key	Indexes	Deletion protection	Read capacity mode	Write capacity mode	Total size	Table class
-	-	0	Off	Provisioned (1)	Provisioned (1)	0 bytes	Standard

Lambda > Functions

Functions (1/1)

Filter by tags and attributes or search by keyword

Last fetched 1 second ago

Actions

View details

Create function

<input checked="" type="checkbox"/>	Function name	Description	Package type	Runtime	Last modified	Actions
<input checked="" type="checkbox"/>	PowerOfMathFunction2	-	Zip	Python 3.10	29 minutes ago	<div>Delete</div>

The new API Gateway console experience is now available
We've redesigned the API Gateway console to make it easier to use. Try out the new console. From 30th October 2023 the old console will no longer be available.

APIs (1)

Find APIs

Actions

Delete

Create API

Name	Description	ID	Protocol	Endpoint type	Created
PowerOfMathAPI2		o4amjfs8f8	REST	Regional	2023-09-19