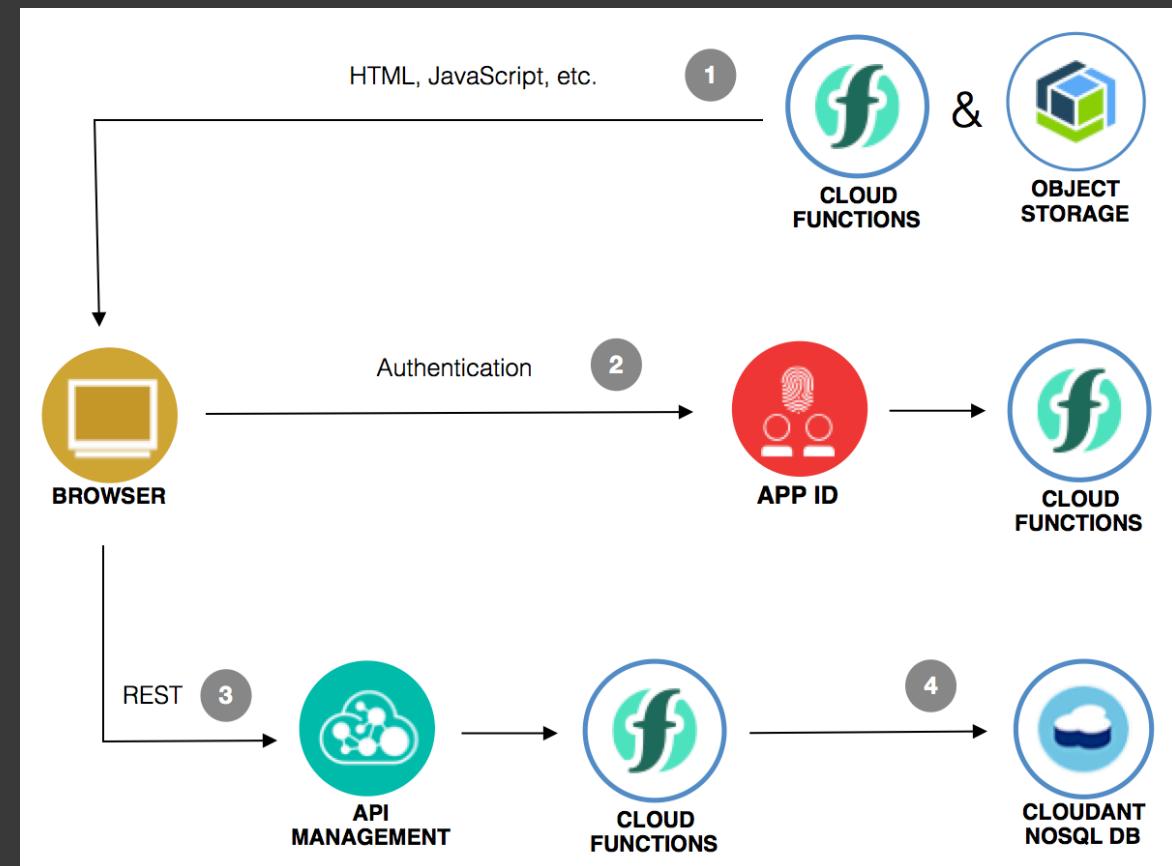


Serverless Web Applications on the IBM Cloud with Apache OpenWhisk



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Developer Advocate
IBM
@nheidloff
heidloff.net

12.12.2018



Why?

Many web and mobile web applications are not used 24x7

For those applications there is a good potential to save costs
when using serverless technologies

Plus developers can focus on writing code, rather than
maintaining infrastructure/servers

What?

Web applications don't only need client side code, but also:

- Server side business logic
- Databases
- User directories and authentication

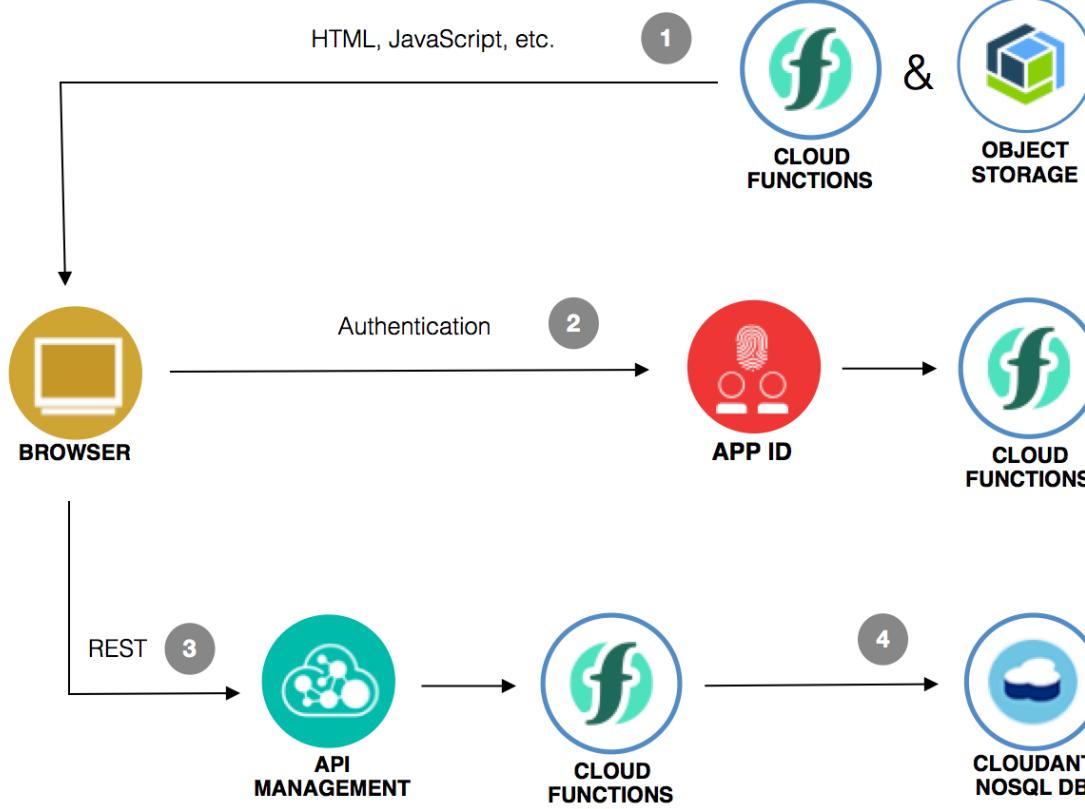
The following sample shows how to build and deploy
end to end web applications with serverless IBM components

Get the code:

<https://github.com/nheidloff/serverless-web-application-ibm-cloud>

Architecture

Serverless Web Applications on the IBM Cloud



1 Static Web Hosting

IBM Cloud Object Storage hosts static web resources. IBM Cloud Functions support custom domains.

2 User Management

IBM App ID provides user management, profiles and authentication to secure backend APIs.

3 Restful API

Web applications can invoke business logic implemented via Apache OpenWhisk functions over an API management service.

4 Serverless Backend

Cloudant is a scalable JSON document database for serverless applications.

Sample Application

Authentication Flow

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home

Login Invoke protected Action

Elements Console Sources Network Performance Memory Application >

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
html	GET	200	www.heidloff.eu	Other	1.3 KB	...	
inline.bundle.js	GET	200	s3.us-south.o...	html	6.1 KB	...	
polyfills.bundle.js	GET	200	s3.us-south.o...	html	216 KB	...	
styles.bundle.js	GET	200	s3.us-south.o...	html	11.4 KB	...	
vendor.bundle.js	GET	200	s3.us-south.o...	html	3.0 MB	...	
main.bundle.js	GET	200	s3.us-south.o...	html	16.0 KB	...	

6 requests | 3.3 MB transferred | Finish: 2.13 s | DOMContentLoaded: 2.34 s | Load: 2.34 s

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home

Login **Invoke protected Action**

Elements Console Sources Network Performance Memory Application »

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
html	GET	200	www.heidloff.eu	Other	1.3 KB	...	
inline.bundle.js	GET	200	s3.us-south.o...	html	6.1 KB	...	
polyfills.bundle.js	GET	200	s3.us-south.o...	html	216 KB	...	
styles.bundle.js	GET	200	s3.us-south.o...	html	11.4 KB	...	
vendor.bundle.js	GET	200	s3.us-south.o...	html	3.0 MB	...	
main.bundle.js	GET	200	s3.us-south.o...	html	16.0 KB	...	

6 requests | 3.3 MB transferred | Finish: 2.13 s | DOMContentLoaded: 2.34 s | Load: 2.34 s

>Login

https://appid-oauth.ng.bluemix.net/oauth/v3/...

niklas_heidloff@de.ibm.com

Password: [Forgot Password?](#)

.....

Login

Elements Console Sources Network Performance Memory Application » 2 X

View: Group by frame Preserve log Disable cache Offline Online

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	Waterfall
authorization?response_type=...	GET	200	appid-oauth.n...	s3.us-...	5.7 KB	
bootstrap.min.css	GET	200	appid-oauth.n...	authori...	19.9 KB	
font-awesome.min.css	GET	200	appid-oauth.n...	authori...	7.5 KB	
jquery-3.2.0.min.js	GET	200	appid-oauth.n...	authori...	85.2 KB	
bootstrap-validator-0.11.9.js	GET	200	appid-oauth.n...	authori...	13.7 KB	
appid-validator.js	GET	200	appid-oauth.n...	authori...	1.6 KB	
default_logo.svg	GET	200	appid-oauth.n...	authori...	5.4 KB	
IBMidicon.png	GET	200	appid-oauth.n...	authori...	794 B	
samlIcon.png	GET	200	appid-oauth.n...	authori...	1.0 KB	
warningIcon.png	GET	200	appid-oauth.n...	authori...	926 B	
default_logo.svg	GET	200	appid-oauth.n...	authori...	5.4 KB	
fontawesome-webfont.woff2?...	GET	200	appid-oauth.n...	authori...	75.9 KB	

12 requests | 223 KB transferred | Finish: 1.71 s | DOMContentLoaded: 1.44 s | Load: 1.71 s

>Login

https://appid-oauth.ng.bluemix.net/oauth/v3/...

niklas_heidloff@de.ibm.com

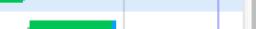
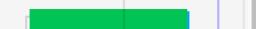
Password: [Forgot Password?](#)

.....

Login

Elements Console Sources Network Performance Memory Application » × 2 ×

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
authorization?response_type=...	GET	200	appid-oauth.n...	s3.us-...	5.7 KB	...	
bootstrap.min.css	GET	200	appid-oauth.n...	authori...	19.9 KB	...	
font-awesome.min.css	GET	200	appid-oauth.n...	authori...	7.5 KB	...	
jquery-3.2.0.min.js	GET	200	appid-oauth.n...	authori...	85.2 KB	...	
bootstrap-validator-0.11.9.js	GET	200	appid-oauth.n...	authori...	13.7 KB	...	
appid-validator.js	GET	200	appid-oauth.n...	authori...	1.6 KB	...	
default_logo.svg	GET	200	appid-oauth.n...	authori...	5.4 KB	...	
IBMidicon.png	GET	200	appid-oauth.n...	authori...	794 B	...	
samlIcon.png	GET	200	appid-oauth.n...	authori...	1.0 KB	...	
warningIcon.png	GET	200	appid-oauth.n...	authori...	926 B	...	
default_logo.svg	GET	200	appid-oauth.n...	authori...	5.4 KB	...	
fontawesome-webfont.woff2?...	GET	200	appid-oauth.n...	authori...	75.9 KB	...	

12 requests | 223 KB transferred | Finish: 1.71 s | DOMContentLoaded: 1.44 s | Load: 1.71 s

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home...

Login Invoke protected Action

Niklas Heidloff is now logged in

Elements Console Sources Network Performance Memory Application »

View: Group by frame Preserve log Disable cache Offline Online

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	Waterfall
auth	POST	302	appid-oauth.n...	Other	951 B	
login?code=WWdCw6PCn8O...	GET	302	www.heidloff.eu	appid...	1.9 KB	
home?access_token=eyJhbG...	GET	200	www.heidloff.eu	/login/l...	1.3 KB	
inline.bundle.js	GET	200	s3.us-south.o...	home?...	6.1 KB	
polyfills.bundle.js	GET	200	s3.us-south.o...	home?...	216 KB	
styles.bundle.js	GET	200	s3.us-south.o...	home?...	11.4 KB	
vendor.bundle.js	GET	200	s3.us-south.o...	home?...	3.0 MB	
main.bundle.js	GET	200	s3.us-south.o...	home?...	16.0 KB	
favicon.ico	GET	200	www.heidloff.eu	Other	1.4 KB	

9 requests | 3.3 MB transferred | Finish: 2.04 s | DOMContentLoaded: 1.85 s | Load: 1.85 s

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home...

Login **Invoke protected Action**

Niklas Heidloff is now logged in

Elements Console Sources Network Performance Memory Application »

View: Group by frame Preserve log Disable cache Offline Online

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	Waterfall
auth	POST	302	appid-oauth.n...	Other	951 B	
login?code=WWdCw6PCn8O...	GET	302	www.heidloff.eu	appid...	1.9 KB	
home?access_token=eyJhbG...	GET	200	www.heidloff.eu	/login/l...	1.3 KB	
inline.bundle.js	GET	200	s3.us-south.o...	home?...	6.1 KB	
polyfills.bundle.js	GET	200	s3.us-south.o...	home?...	216 KB	
styles.bundle.js	GET	200	s3.us-south.o...	home?...	11.4 KB	
vendor.bundle.js	GET	200	s3.us-south.o...	home?...	3.0 MB	
main.bundle.js	GET	200	s3.us-south.o...	home?...	16.0 KB	
favicon.ico	GET	200	www.heidloff.eu	Other	1.4 KB	

9 requests | 3.3 MB transferred | Finish: 2.04 s | DOMContentLoaded: 1.85 s | Load: 1.85 s

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home...

Login Invoke protected Action

Niklas Heidloff is now logged in

Result of the protected action:

```
{ "fromCloudant": "works. so coool!" }
```

Elements Console Sources Network Performance Memory Application > :: X

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
auth	POST	302	appid-oauth.n...	Other	951 B	...	
login?code=WWdCw6PCn8O...	GET	302	www.heidloff.eu	appid_...	1.9 KB	...	
home?access_token=eyJhbG...	GET	200	www.heidloff.eu	/login/l...	1.3 KB	...	
inline.bundle.js	GET	200	s3.us-south.o...	home?...	6.1 KB	...	
polyfills.bundle.js	GET	200	s3.us-south.o...	home?...	216 KB	...	
styles.bundle.js	GET	200	s3.us-south.o...	home?...	11.4 KB	...	
vendor.bundle.js	GET	200	s3.us-south.o...	home?...	3.0 MB	...	
main.bundle.js	GET	200	s3.us-south.o...	home?...	16.0 KB	...	
favicon.ico	GET	200	www.heidloff.eu	Other	1.4 KB	...	
action	GET	200	www.heidloff.eu	polyfill...	977 B	...	

10 requests | 3.3 MB transferred | Finish: 20.11 s | DOMContentLoaded: 1.85 s | Load: 1.85 s

User Directory

IBM App ID



Overview

Identity Providers

Manage

Cloud Directory

SAML 2.0 Federation

Facebook

Google

Custom Identity

Login Customization

Users

Applications

Profiles

Connections

Service credentials

Plan

Dashboard /



appid-webapp

2.6% Used | 974 Authentication event available

[Details](#)

...

Resource Group: default Location: Dallas

Manage Identity Providers

Identity Providers

Authentication Settings

**Cloud Directory**

Host your own users registry

Enabled

[Edit](#)**SAML 2.0 Federation**

Configure your corporate identity provider.

Disabled

[Edit](#)**Facebook**

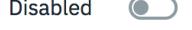
⚠ You are using App ID default configuration.

Disabled

[Edit](#)**Google**

⚠ You are using App ID default configuration.

Disabled

[Edit](#)**Custom Identity**

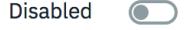
Authenticate with your proprietary identity provider.

Disabled

[Edit](#)**Anonymous**

Associate custom attributes with your users as they interact with your app, before they sign-in.

Disabled

[Edit](#)



Overview

Identity Providers

Manage

Cloud Directory

SAML 2.0 Federation

Facebook

Google

Custom Identity

Login Customization

Users

Applications

Profiles

Connections

Service credentials

Plan

Dashboard /



appid-webapp

2.6% Used | 974 Authentication event available

[Details](#)

⋮

Resource Group: default

Location: Dallas

Cloud Directory Users

There are 1 Cloud Directory users



Enter complete email

[Add User](#)

<input type="checkbox"/>	Username	Email	First Name	Last Name	Last Login Time	Status
<input type="checkbox"/>	niklas_heidloff@de.ibm.com	Niklas Heidloff	November 28, 2018 9:04 AM	Verified		

Items per page: 25 ▾ | 1-1 of 1 items

1 of 1 pages

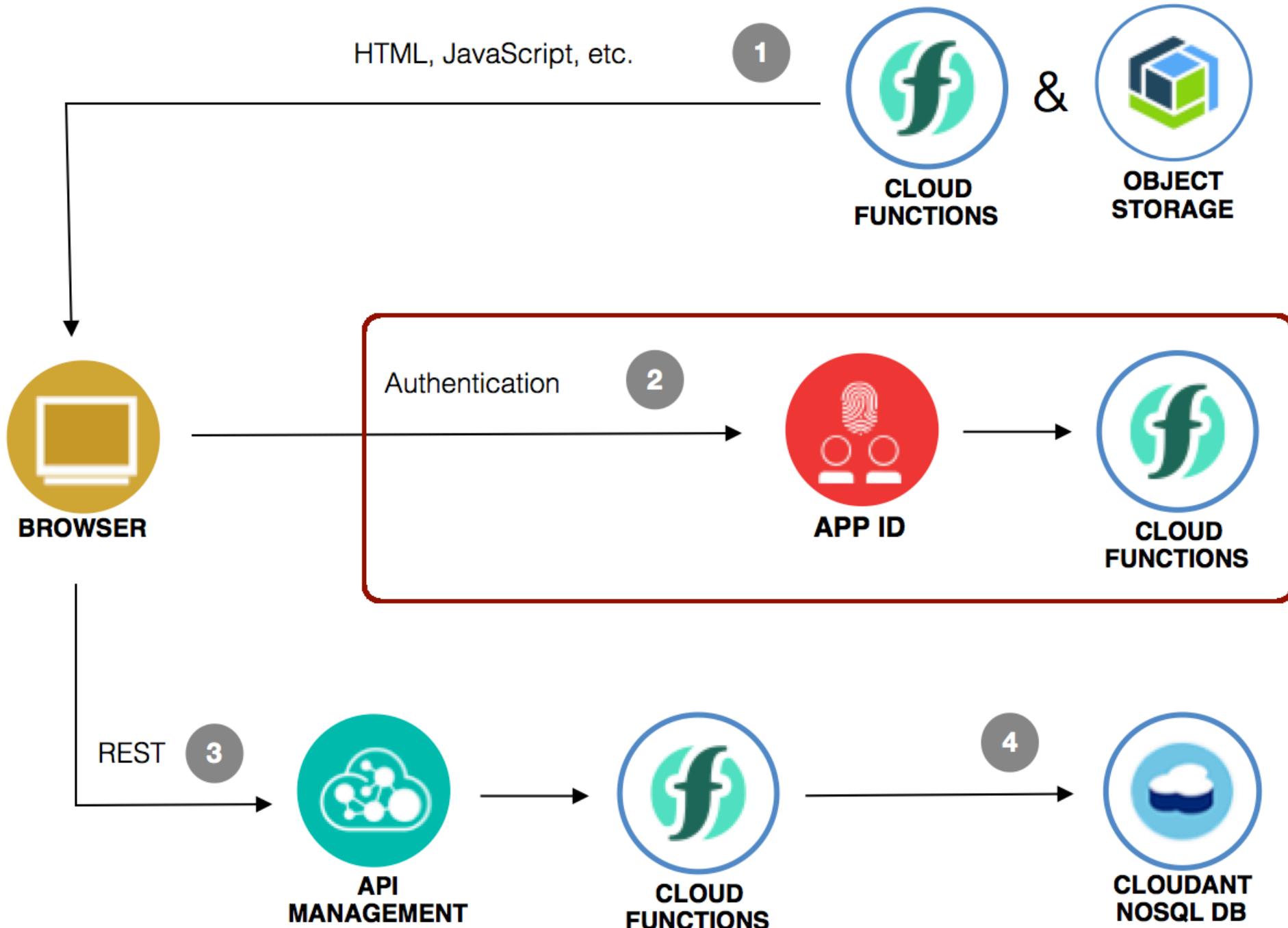


1



Login

App ID and Cloud Functions



[All Cloud Functions APIs](#)

REGION

Dallas

CLOUD FOUNDRY ORG

niklas_heidloff@de.ibm.com

CLOUD FOUNDRY SPACE

demo

Summary[Definition](#)[Sharing](#)[API Explorer](#)**OAuth user authentication**

You can control access to your API through the OAuth 2.0 standard. First require an end user to log in via IBM Cloud App ID, Facebook, GitHub, or Google. Then include the corresponding OAuth token in the Authorization header of each API request. The authenticity of the token will be validated with the specified token provider. If the token is invalid, the request will be rejected and response code 401 will be returned.

**Require users to authenticate via OAuth social login****Provider**

IBM Cloud App ID

App ID service

app-id-serverless

Create

Edit

CORS

Enabling cross-origin resource sharing (CORS) will allow embedded scripts in a web page to call the API across domain boundaries.

**Enable CORS so that browser-based applications can call this API**[Cancel](#)[Save](#)



Functions

Getting Started

Actions

Triggers

Monitor

Logs

APIs

REGION

Dallas

CLOUD FOUNDRY ORG

niklas_heidloff@de.ibm.com

CLOUD FOUNDRY SPACE

demo

serverless-web-app-generic

10 ▾ Items per page | 1-3 of 3 items

1 of 1 pages

< 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
login	Node.js 8	Not Enabled	256 MB	60 s	⋮
login-and-redirect	Sequence	Enabled ✓	256 MB	60 s	⋮
redirect	Node.js 8	Enabled ✓	256 MB	60 s	⋮

serverless-web-app-sample

10 ▾ Items per page | 1-2 of 2 items

1 of 1 pages

< 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
function-protected	Node.js 8	Enabled ✓	256 MB	60 s	⋮
html	Node.js 8	Enabled ✓	256 MB	60 s	⋮

NoSQL Database

IBM Cloudant

← ↗ serverless ⋮

Document ID Options { } JSON ⚡

All Documents +

Query

Permissions

Changes

Design Documents +

library +

Table Metadata { } JSON

Create Document

_id firstname lastname indexes

_design/library { "people": { "analy...

c74072360daacd2... Niklas Heidloff

c74072360daacd2... Thomas Suedbroecker

Showing 4 of 5 columns. Show all columns.

Documents per page: 20 ↪ ↫

This screenshot shows the Apache CouchDB Futon interface for managing a database named 'serverless'. The left sidebar contains navigation links for 'All Documents', 'Query', 'Permissions', 'Changes', 'Design Documents', and a selected 'library' document. The main area displays a table view of documents with columns for '_id', 'firstname', 'lastname', and 'indexes'. The first document listed is '_design/library' with an index entry for 'people'. The second and third documents are 'library' documents belonging to users 'Niklas Heidloff' and 'Thomas Suedbroecker' respectively. At the bottom, there are pagination controls for 'Documents per page' (set to 20) and navigation arrows.

serverless-web-app-sample/function...

Web Action

Space: demo

⋮

Code

Parameters

Runtime

Endpoints

Connected Triggers

Enclosing Sequences

Logs

Code Node.js 8

Edit mode - press ESC to exit

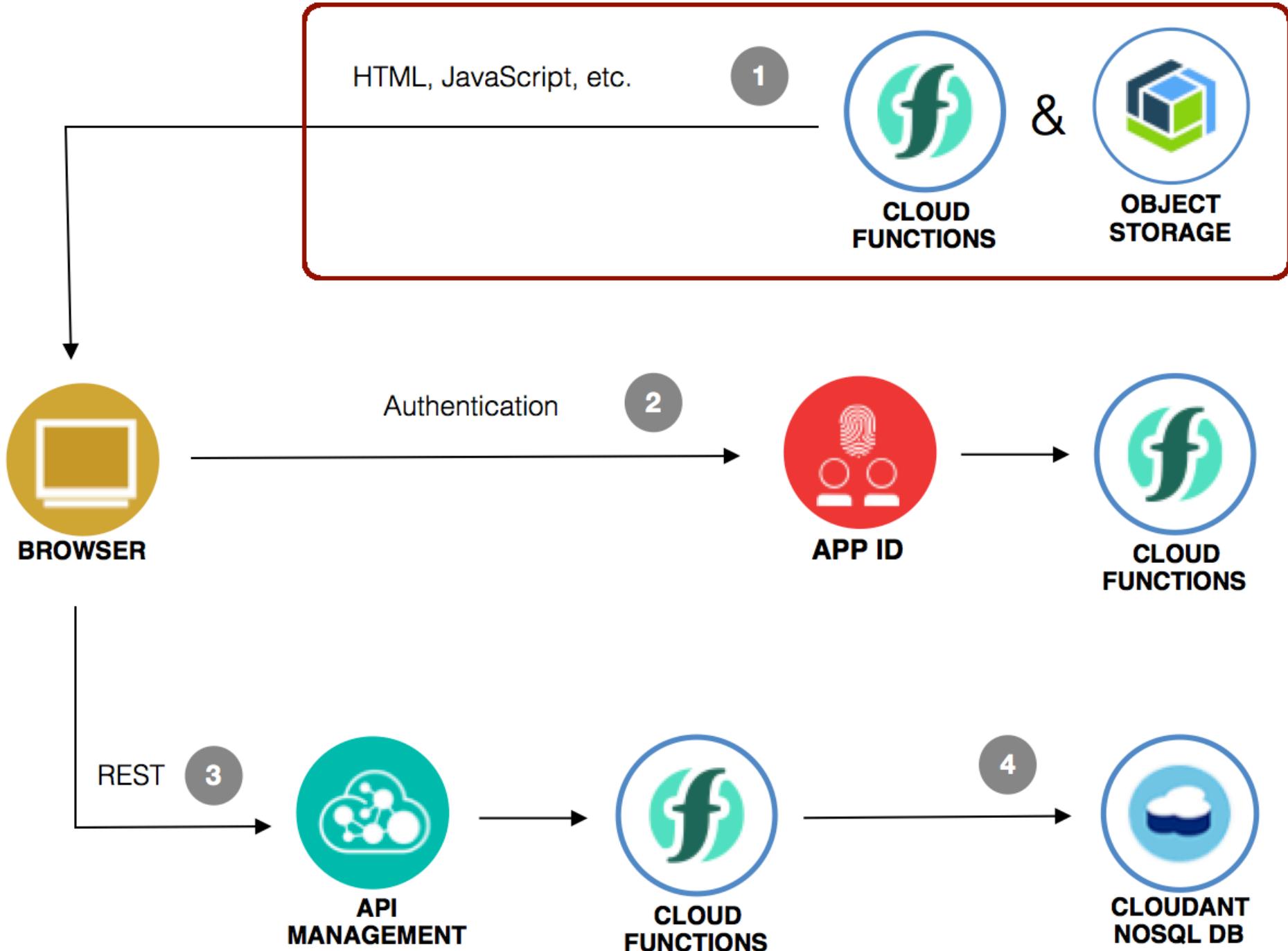
Change Input

Invoke

```
16
17 var Cloudant = require('@cloudant/cloudant');
18
19 function main(params) {
20
21 return new Promise(function (resolve, reject) {
22 try {
23     let cloudant = new Cloudant({ account: params.config.cloudant_username, password: params.config.cloudant_password });
24     let db = cloudant.db.use('serverless');
25
26     db.search('library', 'people', { q: 'firstname:niklas' }, function (err, result) {
27         if (err) {
28             reject({ error: err })
29         }
30         if (result.rows.length > 0) {
31             db.get(result.rows[0].id).then((body) => {
32                 resolve({ fromCloudant: body.lastname });
33             });
34         } else {
35             resolve({ fromCloudant: 'nothing found' });
36         }
37     });
38 });
39 }
40 catch (error) {
41     reject({ error: error })
42 }
43 }
44 }
```

Static Resources Hosting

IBM Cloud Object Storage



OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home

Login Invoke protected Action

Elements Console Sources Network Performance Memory Application >

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
html	GET	200	www.heidloff.eu	Other	1.3 KB	...	
inline.bundle.js	GET	200	s3.us-south.o...	html	6.1 KB	...	
polyfills.bundle.js	GET	200	s3.us-south.o...	html	216 KB	...	
styles.bundle.js	GET	200	s3.us-south.o...	html	11.4 KB	...	
vendor.bundle.js	GET	200	s3.us-south.o...	html	3.0 MB	...	
main.bundle.js	GET	200	s3.us-south.o...	html	16.0 KB	...	

6 requests | 3.3 MB transferred | Finish: 2.13 s | DOMContentLoaded: 2.34 s | Load: 2.34 s

Getting started New

Buckets

Objects

Configuration

Policies

Endpoint

Service credentials

Connections

Usage details

Plan

Resource list / object-storage-serverless / serverlessweb-f98c3f2d-f3a0-422f-b277-f11309045961



serverlessweb-f98c3f2d-f3a0-422f-b277-f11309045961

View docs

Objects



Prefix filter



Upload



<input type="checkbox"/>	Object Name	Archived	Size	Last Modified	...
<input type="checkbox"/>	index.html		1.1 KB	12/05/2018 11:38:23 AM	...
<input type="checkbox"/>	inline.bundle.js		5.8 KB	12/05/2018 11:38:24 AM	...
<input type="checkbox"/>	main.bundle.js		14.5 KB	12/05/2018 11:38:28 AM	...
<input type="checkbox"/>	polyfills.bundle.js		215.7 KB	12/05/2018 11:38:26 AM	...
<input type="checkbox"/>	styles.bundle.js		11.1 KB	12/05/2018 11:38:27 AM	...
<input type="checkbox"/>	vendor.bundle.js		3.0 MB	12/05/2018 11:38:33 AM	...

Items per page: **10** ▾ | 1-10 items

page 1



Drag and drop files or folders to upload them.



Functions

Getting Started

Actions

Triggers

Monitor

Logs

APIs

REGION

Dallas

CLOUD FOUNDRY ORG

niklas_heidloff@de.ibm.com

CLOUD FOUNDRY SPACE

demo

serverless-web-app-generic

10 ▾ Items per page | 1-3 of 3 items

1 of 1 pages

< 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
login	Node.js 8	Not Enabled	256 MB	60 s	⋮
login-and-redirect	Sequence	Enabled ✓	256 MB	60 s	⋮
redirect	Node.js 8	Enabled ✓	256 MB	60 s	⋮

serverless-web-app-sample

10 ▾ Items per page | 1-2 of 2 items

1 of 1 pages

< 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
function-protected	Node.js 8	Enabled ✓	256 MB	60 s	⋮
html	Node.js 8	Enabled ✓	256 MB	60 s	⋮

**Functions**

REGION CLOUD FOUNDRY ORG CLOUD FOUNDRY SPACE
Dallas niklas_heidloff@de.ibm.com demo

Getting Started

Actions

Triggers

Monitor

Logs

APIs

Cloud Functions APIs

Create Managed API +

Name	Route
html	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/serverless
function-protected	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/path
login	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/login

Custom Domains

OpenwhiskAngular

https://www.heidloff.eu/serverless/html/home

Login Invoke protected Action

Elements Console Sources Network Performance Memory Application »

Filter Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	Method	St...	Domain	Initiator	Size	...	Waterfall
html	GET	200	www.heidloff.eu	Other	1.3 KB	...	
inline.bundle.js	GET	200	s3.us-south.o...	html	6.1 KB	...	
polyfills.bundle.js	GET	200	s3.us-south.o...	html	216 KB	...	
styles.bundle.js	GET	200	s3.us-south.o...	html	11.4 KB	...	
vendor.bundle.js	GET	200	s3.us-south.o...	html	3.0 MB	...	
main.bundle.js	GET	200	s3.us-south.o...	html	16.0 KB	...	

6 requests | 3.3 MB transferred | Finish: 2.13 s | DOMContentLoaded: 2.34 s | Load: 2.34 s



Getting Started

Manage

Settings

Dashboard /



Certificate Manager-cc

⋮

Resource Group: default Location: London

Use IBM Cloud Certificate Manager to securely store and centrally manage your SSL certificates.

Import Certificate

Your Certificates

Search for Name, Domain or Issuer

Download Certificate



Name	Domain	Issuer	Algorithm	Key Algorithm	Expires In
<input type="checkbox"/> heidloff.eu	*.heidloff.eu, hei...	Encryption Every...	sha256WithRSA...	rsaEncryption 2...	322 Days

Name
heidloff.eu

Description
[In use by a managed API (Alias 84328f9d)]
[In use by a managed API (Alias 097a97f4)]

Domain: *.heidloff.eu, heidloff.eu

Valid from (UTC): 2018-10-16

Expires on (UTC): 2019-10-16 (322 Days)

Certificate CRN: ... :certificate:2904ee0dc71fc898486ed5e0d5f5cb24

Reimport Certificate

IBM Code

Certificates per page **10** | 1-1 of 1 certificates

1 of 1 pages



API Connect

Lite API Management

Overview

Managed APIs

Shared APIs

Custom domains

APIs

REGION

Dallas

US

EU

APAC

LATAM

Other

Cloud

Customer

www

hub

App C

Customer

Non

Custom domain settings

A CERTIFICATE MANAGER SERVICE, VISIT THE [IBM CLOUD CATALOG](#).

Region Organization Space

US South niklas_heidloff@de.ibm.com demo

Default domain / alias

0 [REDACTED] south.apiconnect.appdomain.cloud

 Assign custom domainDomain name i

www.heidloff.eu

Certificate Manager service

Certificate Manager-cc (London / default)

Certificate

heidloff.eu

Create resource

[Setup guide](#)

Cancel

Save

Deployed Artifacts



IBM Cloud

Catalog

Docs

Support

Manage



Niklas Heidloff's Account



Dashboard

RESOURCE GROUP
All Resources ▾CLOUD FOUNDRY ORG
All Organizations ▾CLOUD FOUNDRY SPACE
All Spaces ▾LOCATION
X Locations 2 ▾CATEGORY
All Categories ▾

Create resource

Services

Name ▾	Location	Resource Gr...	Plan	Details	Service Offe...	
app-id-serverless	Dallas	default	Lite	Provisioned	App ID	⋮
cloudant-serverless	Dallas	default	Lite	Provisioned	Cloudant	⋮
object-storage-serverless	global	default	Lite	Provisioned	Cloud Objec...	⋮

FEEDBACK



Functions

Getting Started

Actions

Triggers

Monitor

Logs

APIs

REGION
DallasCLOUD FOUNDRY ORG
niklas_heidloff@de.ibm.comCLOUD FOUNDRY SPACE
demo

serverless-web-app-generic

10 ▾ Items per page | 1-3 of 3 items

1 of 1 pages < 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
login	Node.js 8	Not Enabled	256 MB	60 s	⋮
login-and-redirect	Sequence	Enabled ✓	256 MB	60 s	⋮
redirect	Node.js 8	Enabled ✓	256 MB	60 s	⋮

serverless-web-app-sample

10 ▾ Items per page | 1-2 of 2 items

1 of 1 pages < 1 >

NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT	⋮
function-protected	Node.js 8	Enabled ✓	256 MB	60 s	⋮
html	Node.js 8	Enabled ✓	256 MB	60 s	⋮

**Functions**

REGION CLOUD FOUNDRY ORG CLOUD FOUNDRY SPACE
Dallas niklas_heidloff@de.ibm.com demo

Getting Started

Actions

Triggers

Monitor

Logs

APIs

Cloud Functions APIs

Create Managed API +

Name	Route
html	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/serverless
function-protected	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/path
login	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/a7ec84e3bcd8d3f5ac899f5ee4d32edece60ef032d9e3bb21c75f4854082769b/login

Get the Code

<https://github.com/nheidloff/serverless-web-application-ibm-cloud>