Lesson 6 @ Facile.it

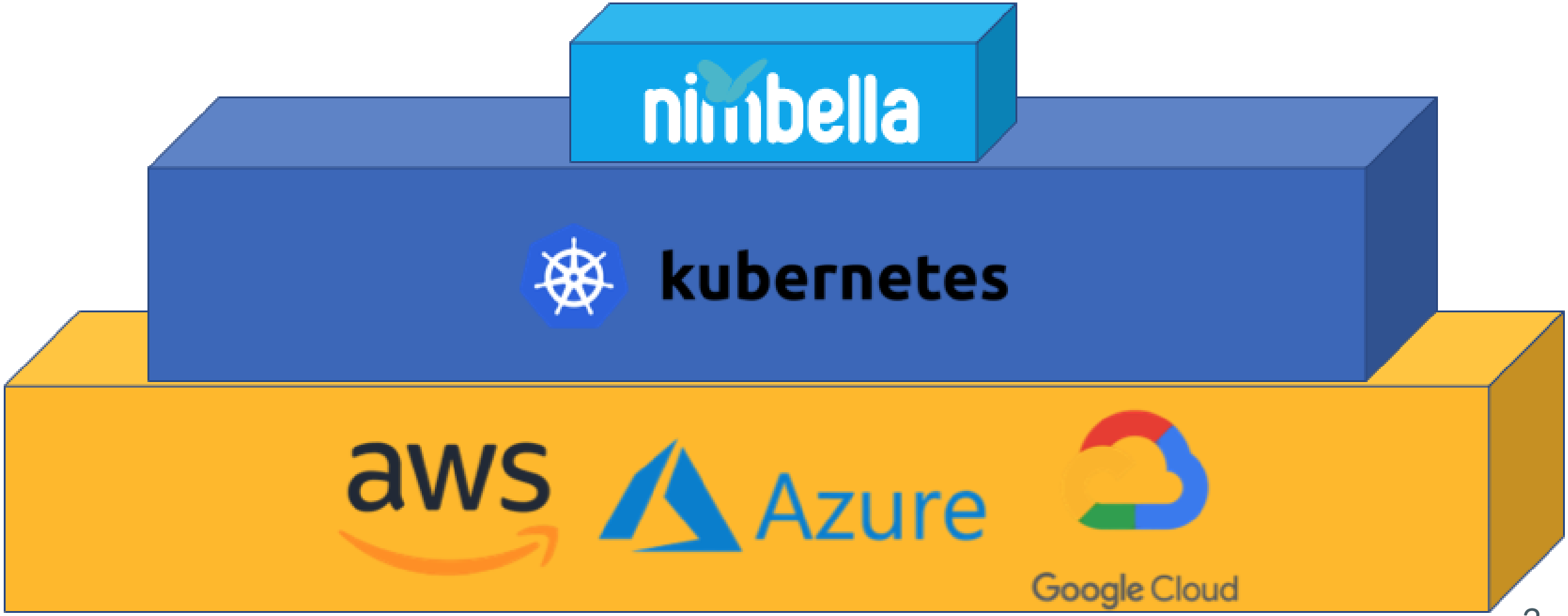
Using Typescript with Nimbella

https://www.nimbella.com

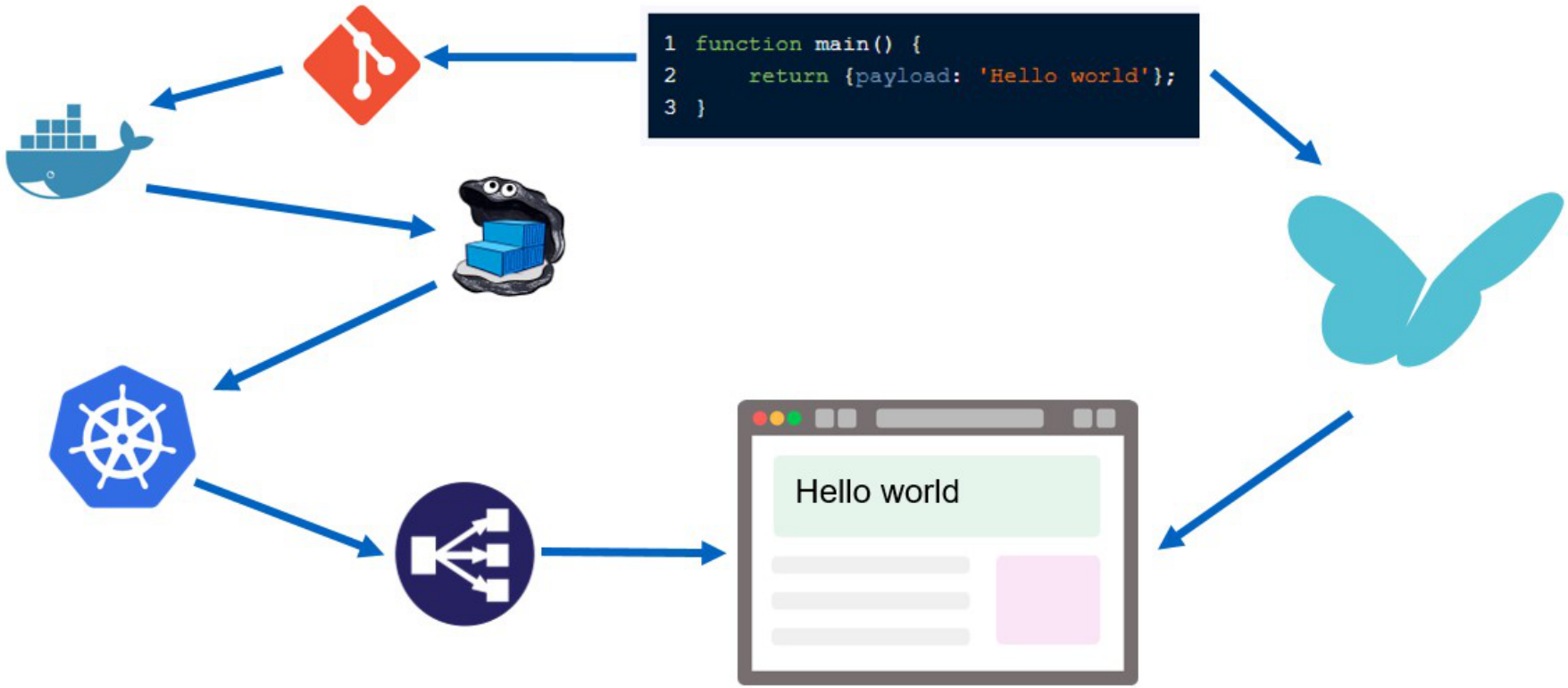
Plan

- Introducing Nimbella
- Sample: a "crud" back-end in javascript
- Adding types: migrating to typescript
- A front-end in Svelte/Typescript

Nimbella vs Kubernetes vs Cloud



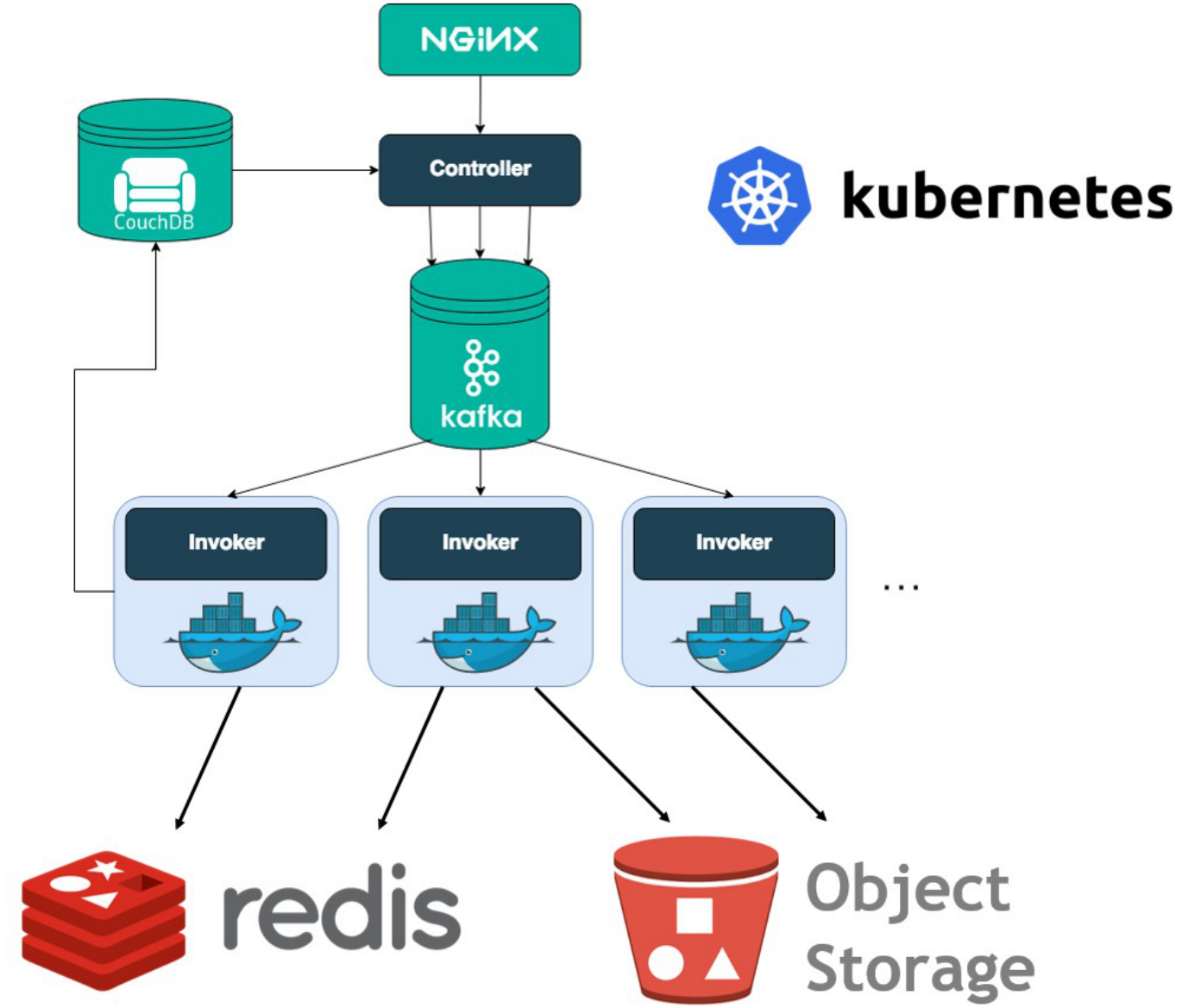
Kubernetes vs Nimbella



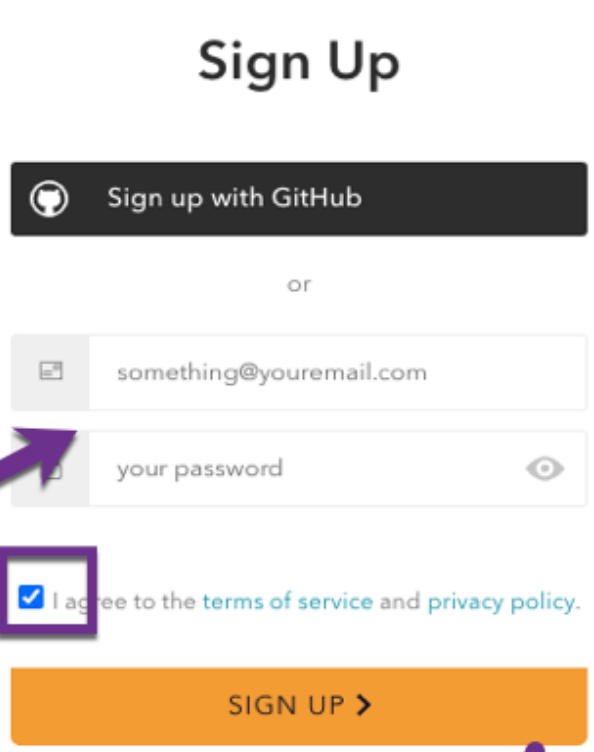
kubernetes

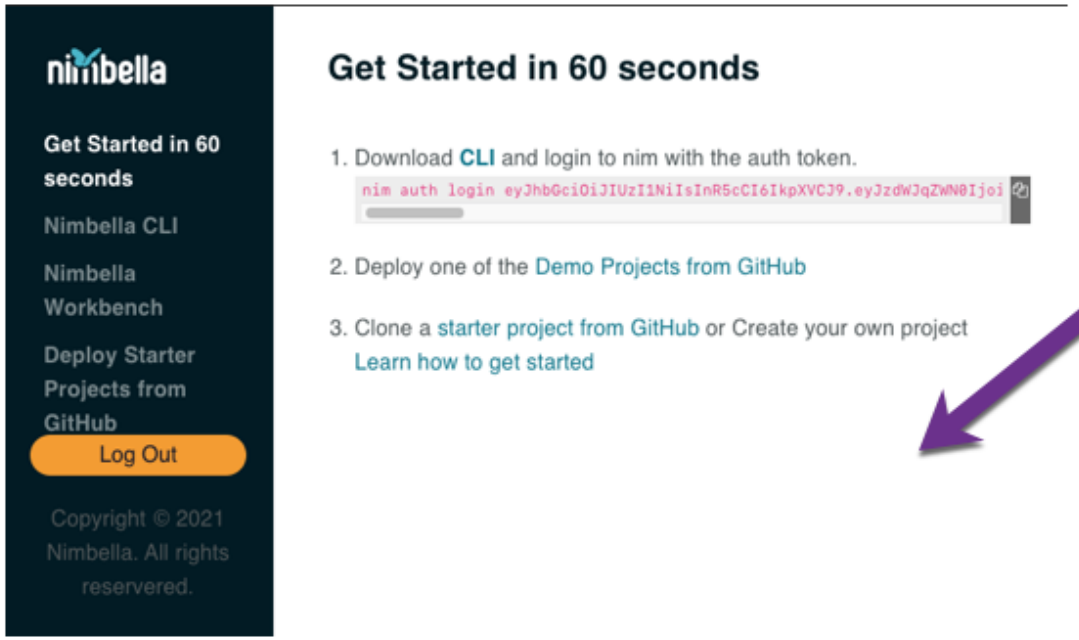
nimbella

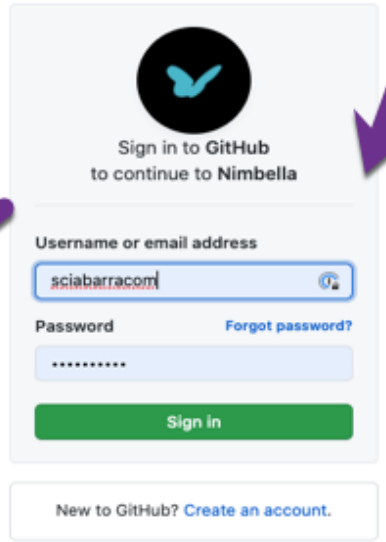
Nimbella Architecture




nimbella
The simplest way to build and run serverless applications.
Start for Free


Sign Up
Sign up with GitHub
or
something@youremail.com
your password
I agree to the terms of service and privacy policy.
SIGN UP


nimbella
Get Started in 60 seconds
Nimbella CLI
Nimbella Workbench
Deploy Starter Projects from GitHub
Log Out
Copyright © 2021 Nimbella. All rights reserved.
Get Started in 60 seconds
1. Download CLI and login to nim with the auth token.
nim auth login eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWJqZWN0Ijoi
2. Deploy one of the Demo Projects from GitHub
3. Clone a starter project from GitHub or Create your own project
Learn how to get started


Sign in to GitHub
to continue to Nimbella
Username or email address
sciabarracom
Password
Forgot password?
Sign in
New to GitHub? Create an account.

A Nimbella project

- Collection of
  - actions (backend)
  - web assets (front-end)
  - redis (storage)
  - bucket (uploads)
  - more...
- Managed with `nim`

Conventions over configurations

- Actions are in `packages` folder
  - Subfolders are packages
  - Use "default" for "no package" actions
- A single file with extension determine the actions
  - It can also be a directory
- Deploy with `nim project deploy <project-dir>`

Login

- `nim auth login`
  open the browser and log into your github account
- `nim auth current`
  show your namespace
- `nim namespace get`
  show what you have in the namespace
- `nim namespace clean`
  cleaning your namespace

Simple Action

```
function main(args) {
    let name = args.name || "world"
    console.log(name)
    return { body: "Hello, "+name }
}
```

Create and Updating an Action

- `nim action create <name> <file>`
- create an action with `<name>` using the `<file>`
- `nim action update <name> <file>`
  - works also if the action does not exists
  - some people only uses `update`

Inspecting Actions

- `nim action list`
  list actions
- `nim action get <name>`
  get informations about an action
- `nim action get <name> --url`
  get the public url of an action

Inspecting the action

```
# create
nim action list
nim action create hello src/hello.js
# Inspecting the action
nim action list
nim action get hello
nim action get hello --url
```

Action invocation with nim

with `action invoke`:

- `nim action invoke <action-name> <parameters>`

`<parameters>`:

- `-p <name> <value> ...`
  can be repeated multiple times
- `-P <file>.json`
  you need a file in json format

Invoking an action with parameters

```
# Invoking an action with parameters
nim action invoke hello
nim action invoke hello -p name Mike

# invoking an action with json
echo '{ "name": "Nimble"}' >args.json
nim action invoke hello -P args.json
```

Action invocation with `curl`

only for web actions!

- `--web true`
  - **not** all the actions are web public
  - *must* return a `body`

use url-encoded parameters

- `curl -X GET <url>?event=hit`
- `curl -X POST -d event=hit <url>`

Using `curl` for web actions

```
# updating as a web action
nim action update hello src/hello.js --web=true

# Using Curl  for web actions
URL=$(nim action get hello --url)
echo $URL

# use GET and url parameters

curl "$URL?name=Mike"

## use POST and form data (url-encoded)
curl -X POST -d name=Mike "$URL"
```

Checking Activations

- `nim activation list [--limit <n>]`
  list actions, you can limit them
- `nim activation logs [<id>]`
  show logs of an activation
- `nim activation result [<id>]`
  show logs of an activation

Activations

```
# Listing Activations
nim activation list --limit 3
date
nim action invoke hello -p name Rodric
nim activation list --limit 3

# Displaying logs and results
nim activation logs
nim activation result
```

Using Redis

- A "in-memory" key-value store
- Data is persisted on disk and backed up
  - can be used as data store
- Very fast
  - can be also used as cache
- Works as shared state
  - multiple actions can read and write

Using `nim kv`

```
# nim kv support
nim kv
nim kv list
nim kv get hello
nim kv set hello world
nim kv list
nim kv get hello
nim kv clean
nim kv list
```

Set in Redis

```
// set.js
function main(args) {
    let db = require("@nimbella/sdk").redis()
    let key = "address:"+args.name
    let value = JSON.stringify({
            "name": args.name || "",
            "company":  args.company  || "",
            "phone": args.phone || ""
    })
    return db.setAsync(key, value)
    .then(reply => { return {"body": reply}})
    .catch(err =>  { return {"body": err}})
}
```

Get in Redis

```
// get.js
function main(args) {
    let db = require("@nimbella/sdk").redis()
    let key = "address:"+args.name
    return db.getAsync(key)
    .then(reply => { return JSON.parse(reply||"")})
    .catch(err =>  { return {"body": err}})
}
```

del.js

```
// del.js
function main(args) {
    let db = require("nim").redis()
    let key = "address:"+args.name
    return db.delAsync(key)
    .then(reply => { return {"body": reply}})
    .catch(err =>  { return {"body": err}})
}
```

Deploy record actions

```
# Deploy fixed actions
mkdir -p address/packages/addr
cp src/set.js address/packages/addr/set.js
cp src/get.js address/packages/addr/get.js
cp src/del.js address/packages/addr/del.js
find address
nim project deploy address
```

Test set/get/del

```
# Test the actions set/get/del
nim action invoke addr/set -p name Michele -p company Nimbella -p phone 392
nim action invoke addr/get -p name Michele
nim action invoke addr/del -p name Michele
nim action invoke addr/get -p name Michele
```

List all records

```
// loading all the records
function main() {
    let db = require("@nimbella/sdk").redis()
    return db.keysAsync("address:*")
    .then(reply =>
      reply.length == 0 ? [] : db.mgetAsync(reply))
    .then(reply => ({
        "body": reply.map(JSON.parse)
      }))
    .catch(err => ({ "body": err}))
}
```

Dissecting `all.js`:

- `db.keysAsync("address:*").then(reply => ...)`:
  reply= `[ 'address:Mirella', 'address:Michele' ]`
- `db.mgetAsync(reply).then(reply => ... )`:
  reply =
  ```
  [ '{"name":"Mirella","company":"Sciabarra","phone":328}',
  '{"name":"Michele","company":"Nimbella","phone":392}' ]
  ```
- `reply.map(['{}', '{"a":1}])`
  = `[{},{"a":1}]`

Deploy and test `all.js`

```
# add all
cp src/all.js address/packages/addr/all.js
nim project deploy address
nim action invoke addr/all
nim action invoke addr/set -p name Michele -p company Nimbella -p phone 392
nim action invoke addr/set -p name Mirella -p company Sciabarra -p phone 328
nim action invoke addr/all
curl $(nim action get addr/all --url)
```

Using TypeScript

- Different solutions:
  - integrated typescript compiler
  - deno runtime
  - **precompilation**
- Next Steps:
  - adding types to our code
  - compile typed code in untyped one
  - integrate compilation in the deployment

hello.ts

```
// hello.ts
export function main(args: {name:string})
: {body:string} {
    let name: string = args.name || 'world'
    let greeting = 'Hello ' + name + '!'
    console.log(greeting)
    return { body: greeting }
}
```

TypeScript: Folders and Files

- `address`: project folder
  - `packages`: backend folder
    - `addr`: package folder
      - `hellots`: action folder
        - `src`: sources folder
          - `index.ts`: the typescript action
          - `packages.json`: configuration file
          - `tsconfig.ts`: compiler file
          - `.include`: list of included files

Create a TypeScript action

```
## Create a TypeScript action
# prepare environment
mkdir -p address/packages/addr/hellots/src
cp src/hello.ts address/packages/addr/hellots/src/index.ts
# initializing
cd address/packages/addr/hellots
npm -y init
tsc --init
# build
ls -la
tsc --outDir .
ls -la
echo "index.js" >.include
# deploy
cd ../../../..
nim project deploy address
```

Integrating with `nim`

- `nim` invokes automatically the build
  - `npm run build` if exists `package.json`
- We need:
  - adding a build step `tsc` in `package.json`
  - configuring `tsc` in `tsconfig.json`

`package.json`:

```
{
 ...
 "scripts": {
    "build": "tsc"
  },
  ...
}
```

- build command running the typescript compiler

`tsconfig.js`:

```
{
  "include": ["src/*.ts"],
  "exclude": [],
  "compilerOptions": {
    "outDir": "./",
    "target": "es2015",
    "module": "commonjs",
} }
```

- include and exclude folders
- set output directory to root of the action
- select target version and module system

Testing the integration

```
# copying configuration and files
cp src/hi.ts address/packages/addr/hellots/src/index.ts
cp src/package.json address/packages/addr/hellots/package.json
cp src/tsconfig.json address/packages/addr/hellots/tsconfig.json
# test and deploy
nim project deploy address
nim action invoke addr/hellots
# expect `hi`
```

From JavaScript to TypeScript

- adding types to the previous examples
  - declare types for used libraries
    - `decl.d.ts`
  - declare types for input and output
    - `index.d.ts`
  - use those types in code
    - `index.ts`

decls.d.ts

```
export interface Record {
    name: string
    company: string
    phone: number
}
export interface Args extends Record {
    op?: string
}
export interface Result {
    data?: Record[]
    record?: Record
    status?: string
    error?: string
}
```

Using Types

```
/// <reference path="index.d.ts" />
import { redis } from "@nimbella/sdk"

import type {Args, Result, Record} from './decl'

function main(args: Args): Promise<{body: Result}>
```

- type declarations for `@nimbella/sdk`
- define `Args`, `Result` and `Record`
- input and output types

Declare module for `@nimbella.sdk`

```
// index.d.ts
declare module "@nimbella/sdk" {
    export function redis(): RedisClient;
    export interface RedisClient extends NodeJS.EventEmitter {
        setAsync(key:string, value:string): Promise<number>;
        getAsync(key:string): Promise<string>;
        delAsync(key:string): Promise<number>;
        keysAsync(pattern:string): Promise<Array<string>>;
        mgetAsync(keys:Array<string>): Promise<Array<string>>;
    }
}
```

`index.ts` structure

```
/// <reference path="index.d.ts" />
import { redis } from "@nimbella/sdk"
import type {Args,Result,Record} from './decls'
```

```
export function main(args: Args): Promise<{body:Result}> {
    let db = redis()
    let key = "address:"+args.name
    switch (args.op) {
        // insert here
        // get/set/del/all
        default:
            return Promise.resolve({ body: { error: "unknown op" } })
    }
}
```

set

```
case "set":
    delete args.op
    // save record
    return db.setAsync(key,
           JSON.stringify(args))
        .then(reply =>
           ({ body: { status: reply.toString() } }))
        .catch(err =>
           ({ body: { error: err } }))
    break
```

- `Args extends Record` with `op?: string`

`get` and `del`

```
case 'get':
    return db.getAsync(key)
        .then(reply =>
            ({ body: { record: JSON.parse(reply) } }))
        .catch(err => ({ body: { error: err } }))
    break
```

```
case 'del':
    return db.delAsync(key)
        .then(reply =>
            ({ body: { status: reply.toString() } }))
        .catch(err => ({ body: { error: err } }))
    break
```

all

```
case 'all':
    return db.keysAsync("address:*")
        .then(reply =>
         reply.length == 0
          ? [] as string[]
          : db.mgetAsync(reply))
        .then(reply => ({body: { data:
              reply.map(JSON.parse as (x:string)=> Record) }
         }))
        .catch(err => ({ body: { error: err } }))
```

- `[] as string[]`
- `JSON.parse as (x:string)=> Record`

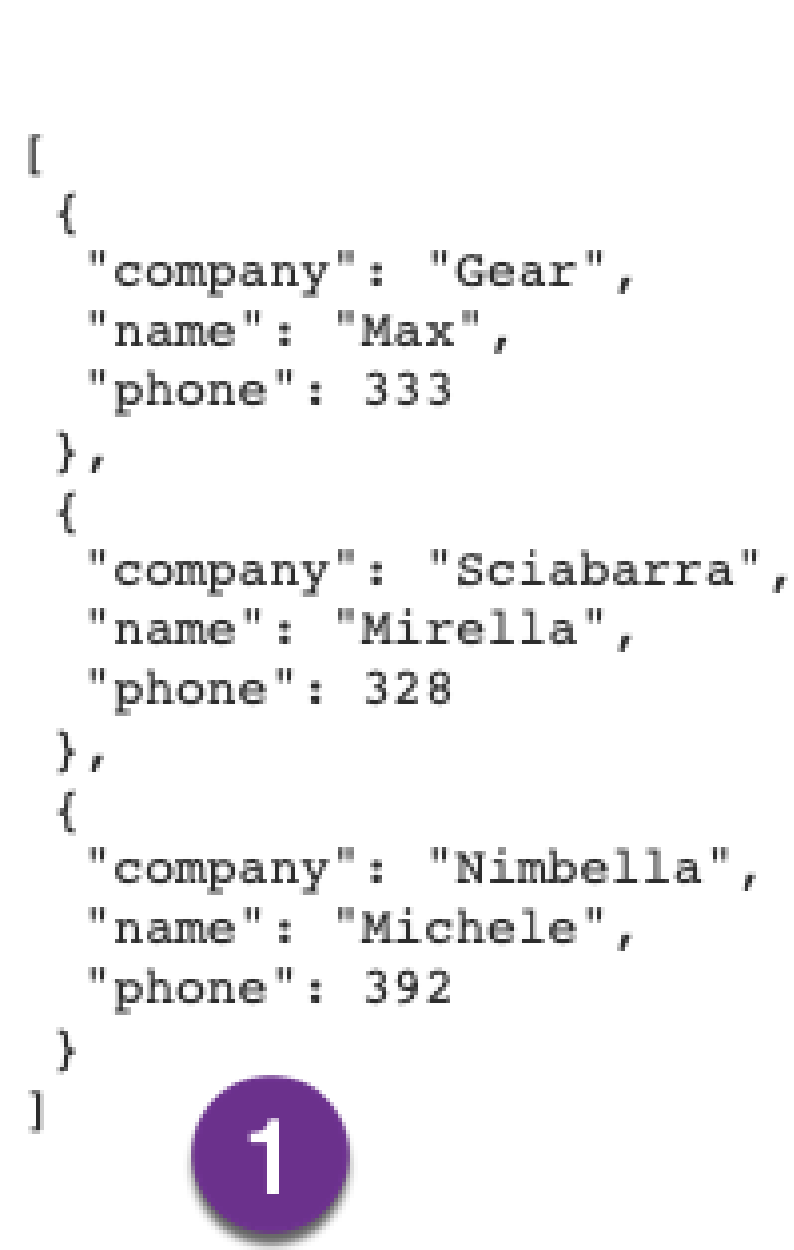
Deploying crud

```
## Deploying Crud
# prepare crud typescript
mkdir -p address/packages/addr/crud/src
cp src/package.json  address/packages/addr/crud/package.json
cp src/tsconfig.json address/packages/addr/crud/tsconfig.json
cp src/decl.d.ts      address/packages/addr/crud/src/decl.d.ts
cp src/index.d.ts     address/packages/addr/crud/src/index.d.ts
cp src/index.ts       address/packages/addr/crud/src/index.ts
echo "index.js"     > address/packages/addr/crud/.include

# deploy
find address/packages/addr/crud
nim project deploy address
ls -la address/packages/addr/crud
# note the index.js has been generated
```

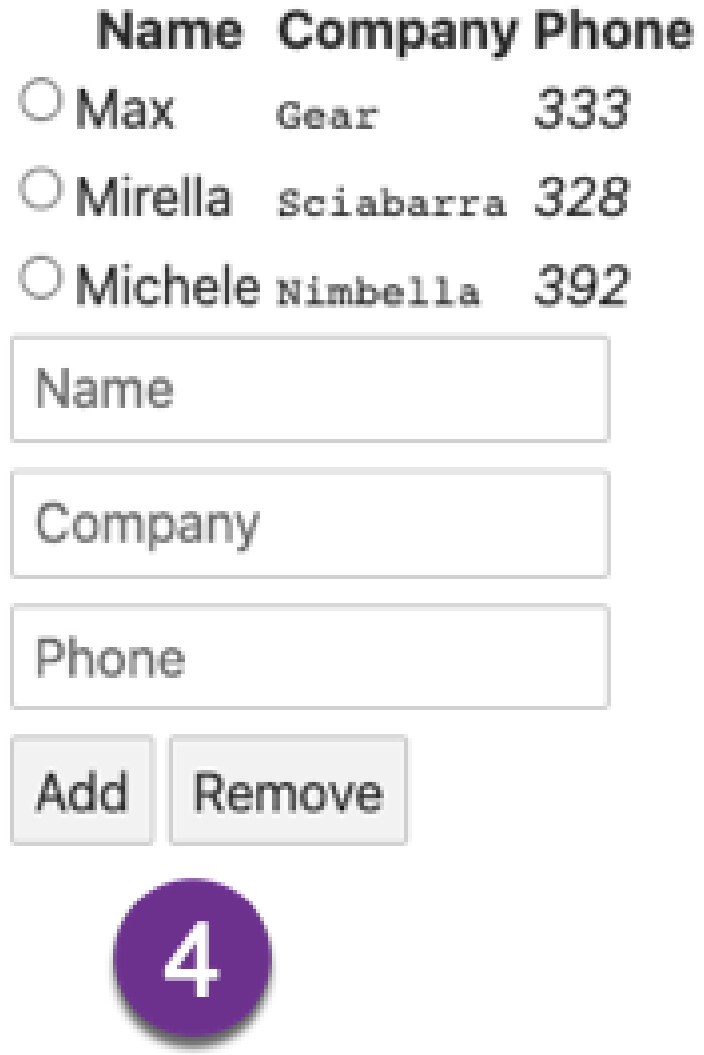
Testing crud

```
nim kv clean
nim action invoke addr/crud -p op all
nim action invoke addr/crud -p op set -p name Michele -p company Nimbella -p phone 392
nim action invoke addr/crud -p op get -p name Michele
nim action invoke addr/crud -p op set -p name Mirella -p company Butterfly -p phone 328
nim action invoke addr/crud -p op all
nim action invoke addr/crud -p op del -p name Michele
nim action invoke addr/crud -p op all
```


[
{
"company": "Gear",
"name": "Max",
"phone": 333
},
{
"company": "Sciabarra",
"name": "Mirella",
"phone": 328
},
{
"company": "Nimbella",
"name": "Michele",
"phone": 392
}
]
1


Max Gear 333
Mirella Sciabarra 328
Michele Nimbella 392
2


Name Company Phone
Max Gear 333
Mirella Sciabarra 328
Michele Nimbella 392
Name
Company
Phone
Add
3


Name Company Phone
Max Gear 333
Mirella Sciabarra 328
Michele Nimbella 392
Name
Company
Phone
Add
Remove
4

Create a svelte app

- `npx degit sveltejs/template web`
  it uses a template on GitHub
- requires some configuration:
  - `project.yml`
  - `web/.include`

Setup Svelte

```
# setup svelte
cd address
# create a template
npx degit sveltejs/template web
# strip one level
echo -e "bucket:\n  strip: 1" >project.yml
cd web
# enable typescript
node scripts/setupTypeScript.js
# include public
echo "public" >.include
cd ../..
nim project deploy address
```

How to use a subfolder

- `project.yml` (strip one level):

```
bucket:
  strip: 1
```

- `web/.include` (pick the subfolder `public`):

```
public
```

Svelte is "reactive"

- declare: `let data: Record[] = []`
- assign: `data = []`
  - triggering update view
    - templates are re-evaluated
- `onMount` executed when view ready

Load all data

```
<script lang="ts">
  import type {Record, Result, Args} from './decl'

  let data: Record[] = []

  function all()  {
      fetch("/api/addr/crud?op=all")
      .then(r => r.json() as Result)
      .then(d => data = d.data ? d.data : [])
  }
  // init
  import { onMount } from 'svelte'
  onMount(all)
</script>
```

Svelte templates

- Reactive:
  - just update variables to re-evaluate
- `{#each data as row}`
  - iterates array assigning elements to `row`
  - `{row.name}`
    - renders value
- `{/each}`
  - closes block

Adding the table

```
<table>
  <tr>
    <th>Name</th>
    <th>Company</th>
    <th>Phone</th>
  </tr>
  {#each data as row}
      <tr>
        <td>{row.name}</td>
        <td><tt>{row.company}</tt></td>
        <td><i>{row.phone}</i></td>
      </tr>
  {/each}
</table>
```

Deploy

```
cp src/decl.d.ts address/web/src/decl.d.ts
cp src/App1.svelte address/web/src/App.svelte
nim project deploy address
```

Form

```
let form = <Record>{};

function add() {
    let args: Args = form
    args.op = "set"
    fetch("/api/addr/set", {
      method: "POST",
      headers: { "Content-Type": "application/json" },
      body: JSON.stringify(args),
    }).then(all);
}
```

Svelte Bindings

- `<input bind:value={form.name}>`
  - value stored into `form.name`

Svelte events

- `<button on:click={add}>Add</button>`
  - event `click` execute function `add`

Form HTML

```
<form>
  <input placeholder="Name"
   bind:value={form.name}>
  <br>
  <input placeholder="Company"
   bind:value={form.company}>
  <br>
  <input placeholder="Phone"
   bind:value={form.phone}>
  <br>
</form>
<button on:click={add}>Add</button>
```

Deploy v3

```
# deploy v3
cp src/App2.svelte address/web/src/App.svelte
nim project deploy address
```

Remove

```
let select: string;
function remove() {
  fetch("/api/addr/crud?op=del&name=" + select)
  .then(all);
}
```

Remove (changes)

```
 <table>
    <tr>
+     <th></th>
      <th>Name</th>
...
      <tr>
+       <td>
+         <input type="radio"
+          bind:group={select}
+          value={row.name} />
+       </td>
        <td>{row.name}</td>
...
  <button on:click={add}>Add</button>
+ <button on:click={remove}>Remove</button>
```

Final

```
# deploy v4
cp src/App3.svelte address/web/src/App.svelte
nim project deploy address
```