



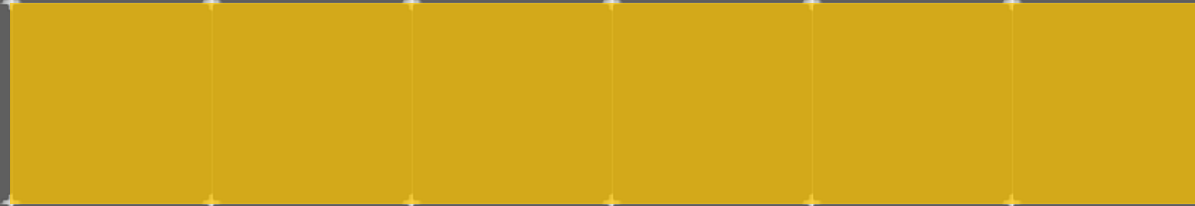
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Mbed Cloud Services

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Presentation slides:
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Mbed Cloud



Mbed Cloud in context



IoT Device Application

Mbed Clients – Mbed OS, Tools

Device Silicon and Hardware

Device Software

arm MBED

Mbed Cloud

- Device Update, Firmware Installation
- Device Provisioning, Identity, Onboarding
- Device Connectivity, Events, Monitoring

Device Services

IoT Cloud Applications

Analytics and Rules Engines

Events, Streaming, Message Busses

Web Servers, Load Balancing

App Management, Monitoring, Logging

VMs, Compute, Auto-scaling

Databases, Caching, Storage, Archiving

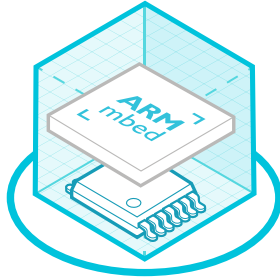
3rd Party Cloud Platforms & Services

mbed IoT device platform: device services for scale

mbed Clients

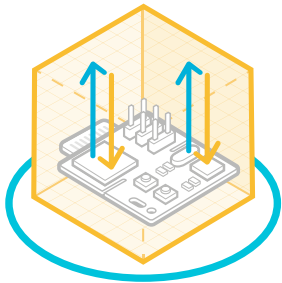
mbed OS

Unparalleled power-efficiency and security for new IoT devices



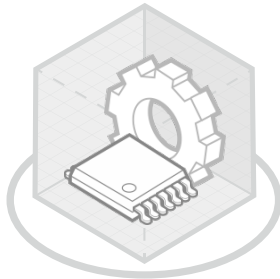
mbed Enabled products

Tested interoperability for IoT that can be trusted



mbed for other Operating Systems

Supporting more technology choices



Key technologies



Thread



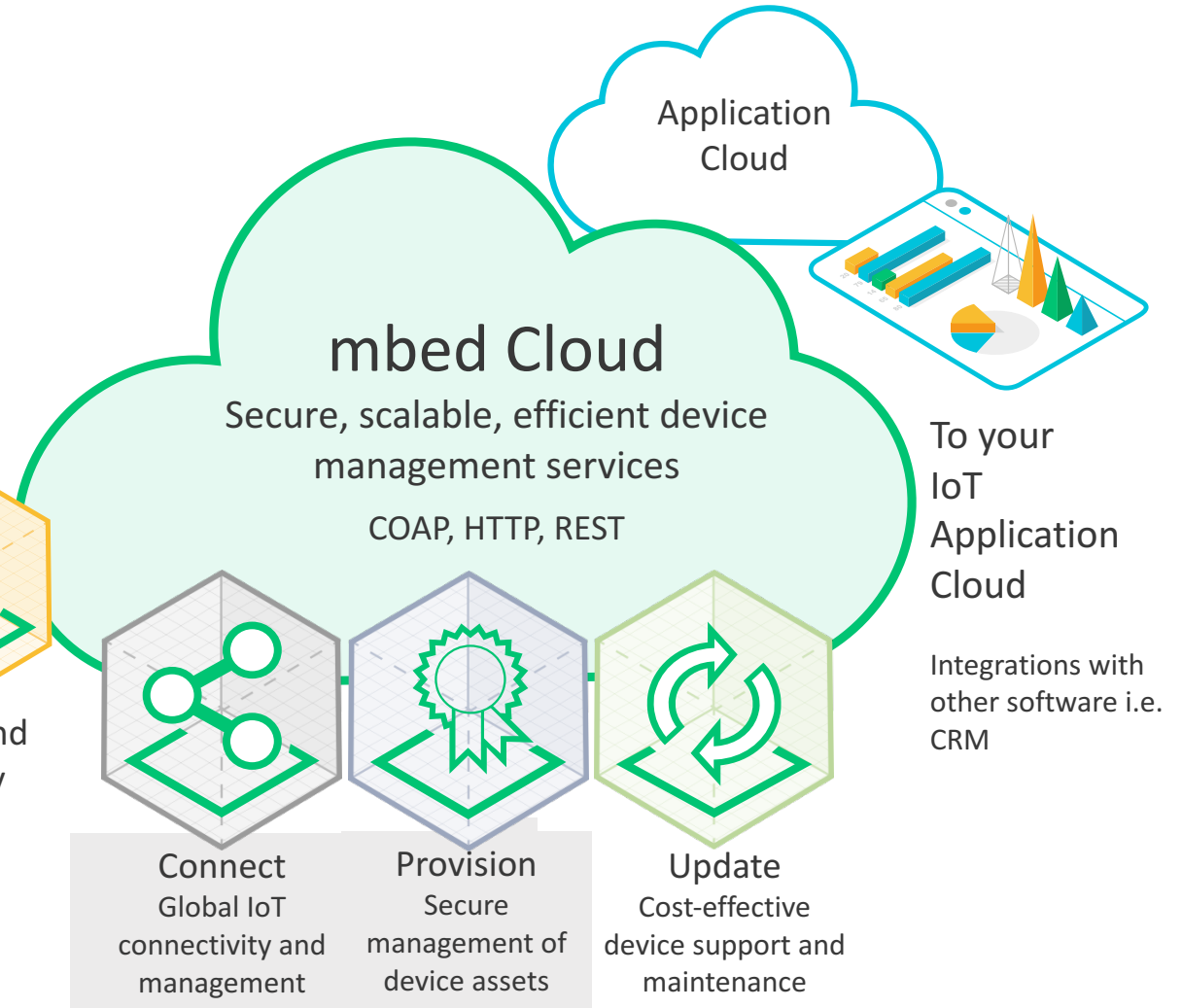
BLE



6lowPAN



End to end security



Foundation services

Device Directory

- Manage devices, queries, device events

Update Service

- Manage firmware images, manifests and secure and trusted firmware update for devices

Account Management

- Manage accounts, groups, users, create API keys and upload trusted certificates

Connect

- Managing connected devices

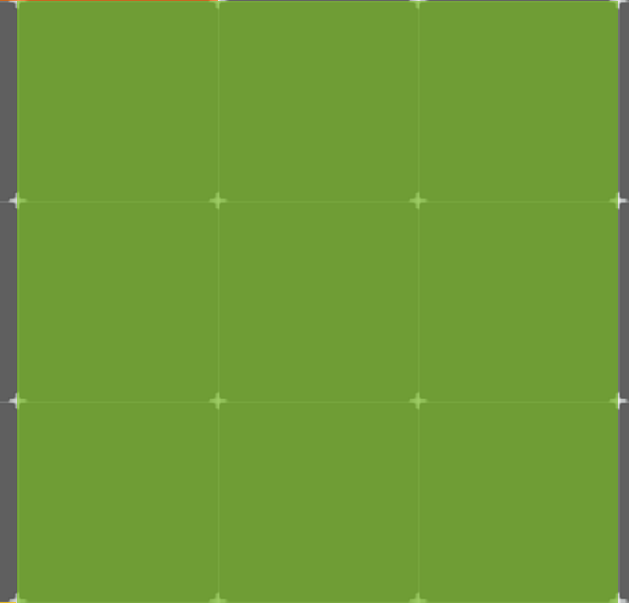
Certificates

- Manage BYOC and developer certificates

Statistics

- Provide statistics about Cloud Services and connected devices

Mbed Cloud Portal



Mbed Cloud Portal

Driving factors for building a user interface for Mbed Cloud services



Simple device management

Point and click user interface, making it easy to understand the core IoT device management features in Mbed Cloud.



User experience design

Developing the Mbed Cloud Portal allows us to put a user experience suitable for managing millions of devices in place.



Integration guide

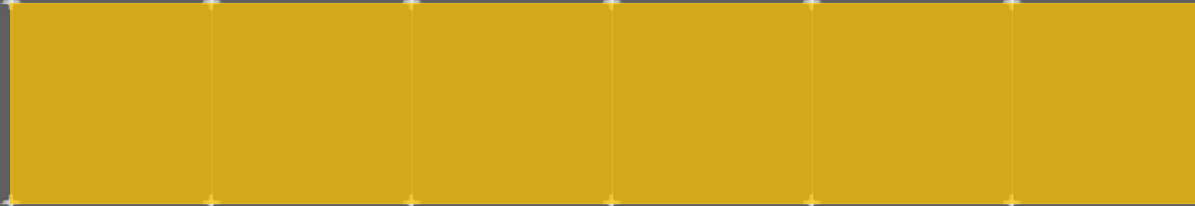
Partners can integrate Mbed Cloud APIs into their own stacks by following the Mbed Cloud Portal as an example.



Development system

Partners can experiment with firmware update campaigns, and device resource interrogation – small scale development to better understand IoT.

Mbed Cloud SDK



SDK core features and concepts

Mbed Cloud SDKs group the underlying APIs of Mbed Cloud into logical blocks of functionality in Javascript, Python, C# and Java. This makes it quick and easy to integrate device management into 3rd party software stacks.

Certificates

Generate device certificates to use in development.

Connect

List connected devices, register webhooks and subscribe to resources.

Common elements

Exception handling, decoders, and other common concepts.

Auto-generation

Each SDK base is generated from the Swagger documents for the API.

Update

Manage secure firmware update campaigns.

Device directory

Get lists of registered devices, details and events related to specific devices. Generate queries and filters.

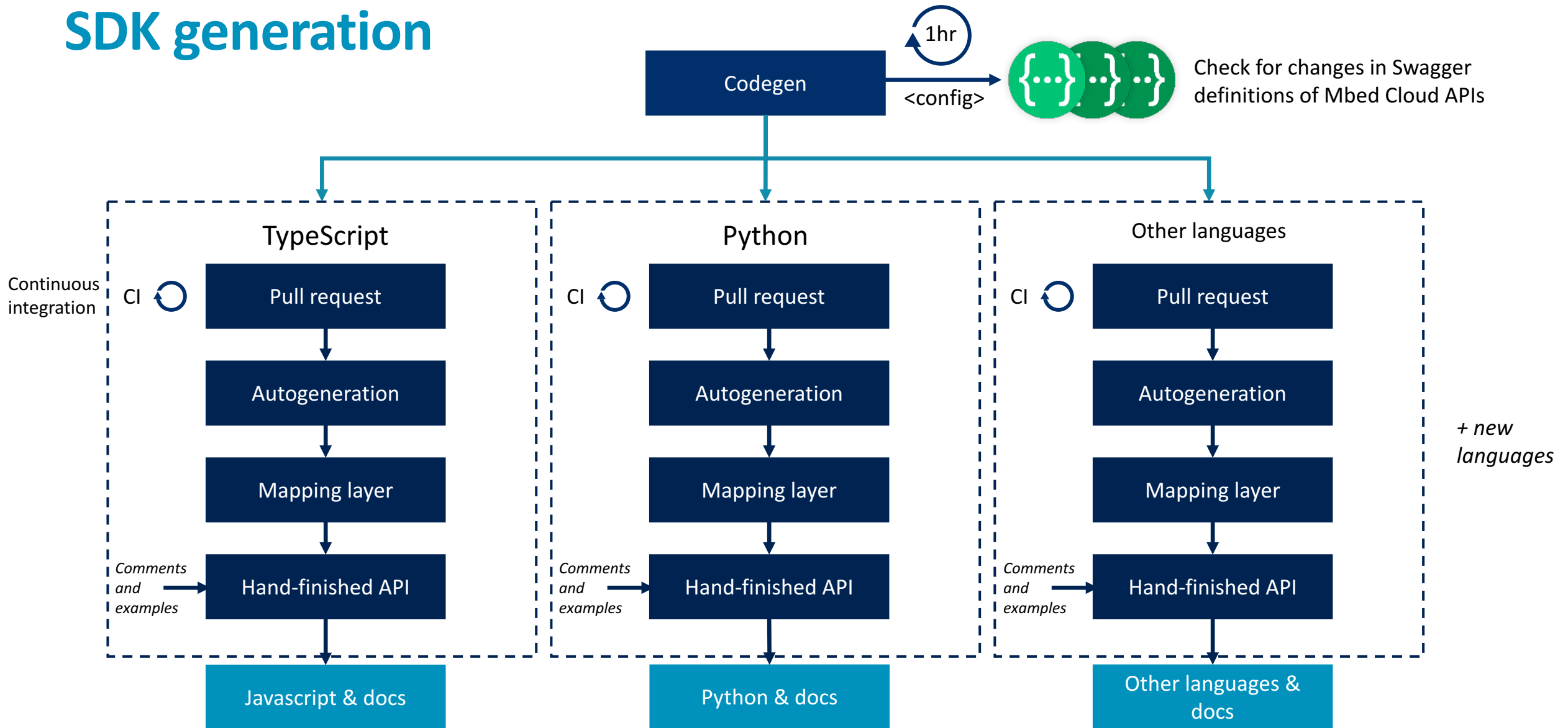
Account management

Manage API keys and users across an Mbed Cloud account.

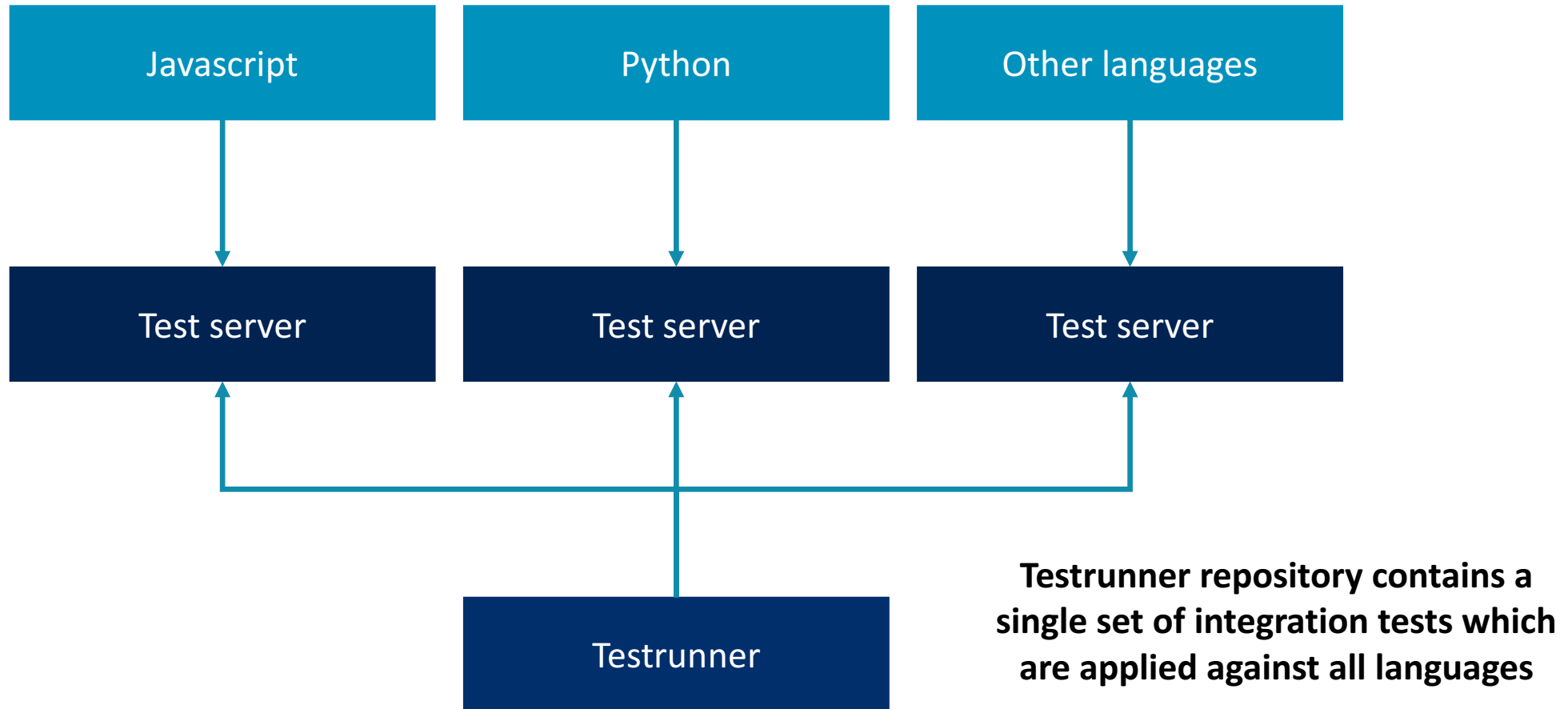
Language-specific docs

Documentation is generated in language-familiar formats (e.g. Sphinx for Python)

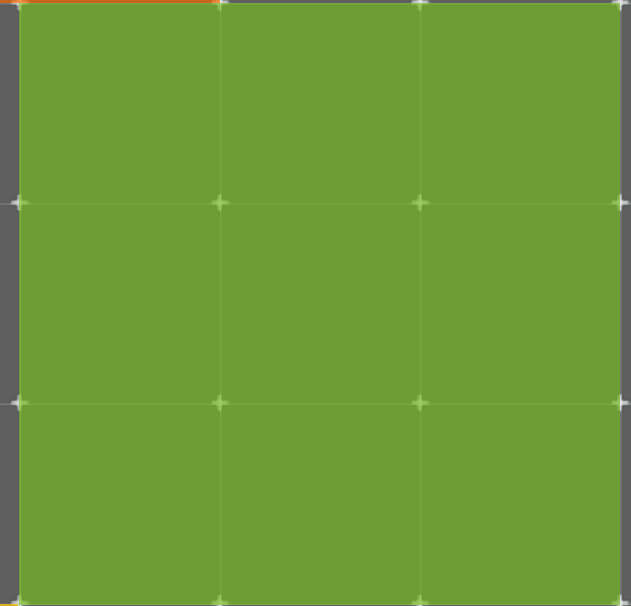
SDK generation



SDK testing



Examples of JavaScript SDK usage



```
var update = new MbedCloudSDK.UpdateApi(window.config);
update.listFirmwareImages({
    include: ["totalCount"],
    order: "DESC",
    limit: 10
}, function(error, response) {
    if (error) return alert(error.message);
    // Get all images
    response.data.forEach(function(image) {
        // {Consume single image}
    });
});
```

```
var deviceDirectory = new
MbedCloudSDK.DeviceDirectoryApi(window.config);

devices.getDevice('015c5ed320c00000000000', function(error, device) {
    if (error) throw error;
    // Utilize device here
});
```

```
var devicesApi = new MbedCloudSDK.DeviceDirectoryApi(window.config);  
devicesApi.getDevice('015c5ed320c00000000000', function(error, device)  
{  
    if (error) throw error;  
    // Utilize device here  
});
```

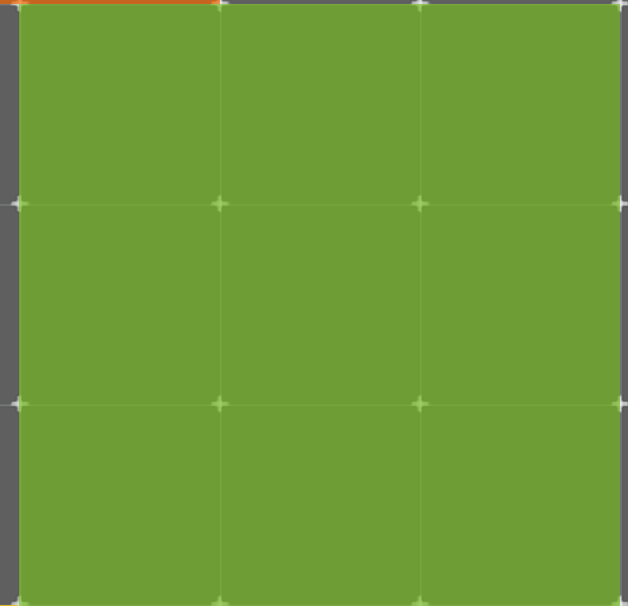
```
var devicesApi = new MbedCloudSDK.DeviceDirectoryApi(window.config);

devicesApi.getDevice('015c5ed320c00000000000')
  .then(device => {
    // Utilize device here
  })
  .catch(error => {
    throw error;
  })
```



```
devices.listDevices({
  filter: {
    state: { $eq: "bootstrapped" },
    createdAt: { $gte: new Date("01-01-2014"), $lte: new Date("01-01-2018") },
    updatedAt: { $gte: new Date("01-01-2014"), $lte: new Date("01-01-2018") }
  }
})
.then(devices => {
  // Utilize devices here
})
.catch(error => {
  console.log(error);
});
```

Examples of Python SDK usage



```
from mbed_cloud.connect import ConnectAPI
connectApi = ConnectAPI()
connectApi.start_notifications()
devices = connectApi.list_connected_devices()
# Synchronously get the current value of the resource
value = connectApi.get_resource_value(devices[0].id, "/5001/0/1")
print("Current resource value: %r" % value)
# Set new value of the resource
connectApi.set_resource_value(device_id=devices[0].id,
                              resource_path="/5001/0/1",
                              resource_value="10")
```

Documentation

Mbed Cloud: <https://cloud.mbed.com/docs/v1.2>

Cloud Portal: <https://portal.us-east-1.mbedcloud.com/>

Mbed Cloud API: <https://cloud.mbed.com/docs/v1.2/api-references/index.html>

Mbed Cloud JavaScript SDK: <https://cloud.mbed.com/docs/v1.2/mbed-cloud-sdk-javascript/index.html>

Mbed Cloud Python SDK: <https://cloud.mbed.com/docs/v1.2/mbed-cloud-sdk-python/index.html>

Workshop

1. Clone Mbed Cloud JavaScript SDK: <https://github.com/ARMmbed/mbed-cloud-sdk-workshop>
2. Clone docker repository with all necessary tools installed: <https://github.com/ARMmbed/mbed-tools-docker>
3. Build docker image: `bash docker-build.sh`
4. Run docker container: `bash docker-run.sh <path to Mbed Cloud JavaScript workshop>`
5. Develop awesome code that uses Mbed Cloud JavaScript SDK !!!

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Thank You!

Danke!

Merci!

谢谢!

ありがとう!

Gracias!

Kiitos!

감사합니다

धन्यवाद

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