MONGODB /
WORLD

Terraform New Worlds on MongoDB Atlas

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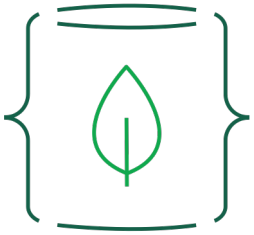
Welcome!

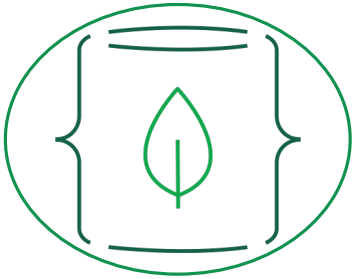
- Sr. Product Manager in Cloud, focus Automation
- Formally a Solution Architect
- Before that an ops gal – Started with SGI IRIX and Red Hat pre RHEL.
- Tech Mantra: Learn it, Master it (enough). Script it. Rest. Repeat.
- And a Trekkie so …

Welcome Cadets!
Starfleet Academy for Automation

Today's Training Agenda



MongoDB Atlas



MongoDB Atlas API

Terraform

Vault

Future Mission Plan

Cadets, Have You Used?

- MongoDB Atlas?
- MongoDB Atlas API?
- Terraform?
- Vault?
- Bonus!!! Star Trek Fan? Star Wars Fan? Both?

MongoDB Atlas

Starfleet is focused on building applications that allow us to explore strange new worlds & seek out new civilizations

- MongoDB Atlas was selected earlier this year
  - Focus on apps not ops
- Can quickly spin up on multiple cloud providers in multiple planetary* regions!
- Easy to use UI

**currently limited to Earth*

MongoDB Atlas UI Demo

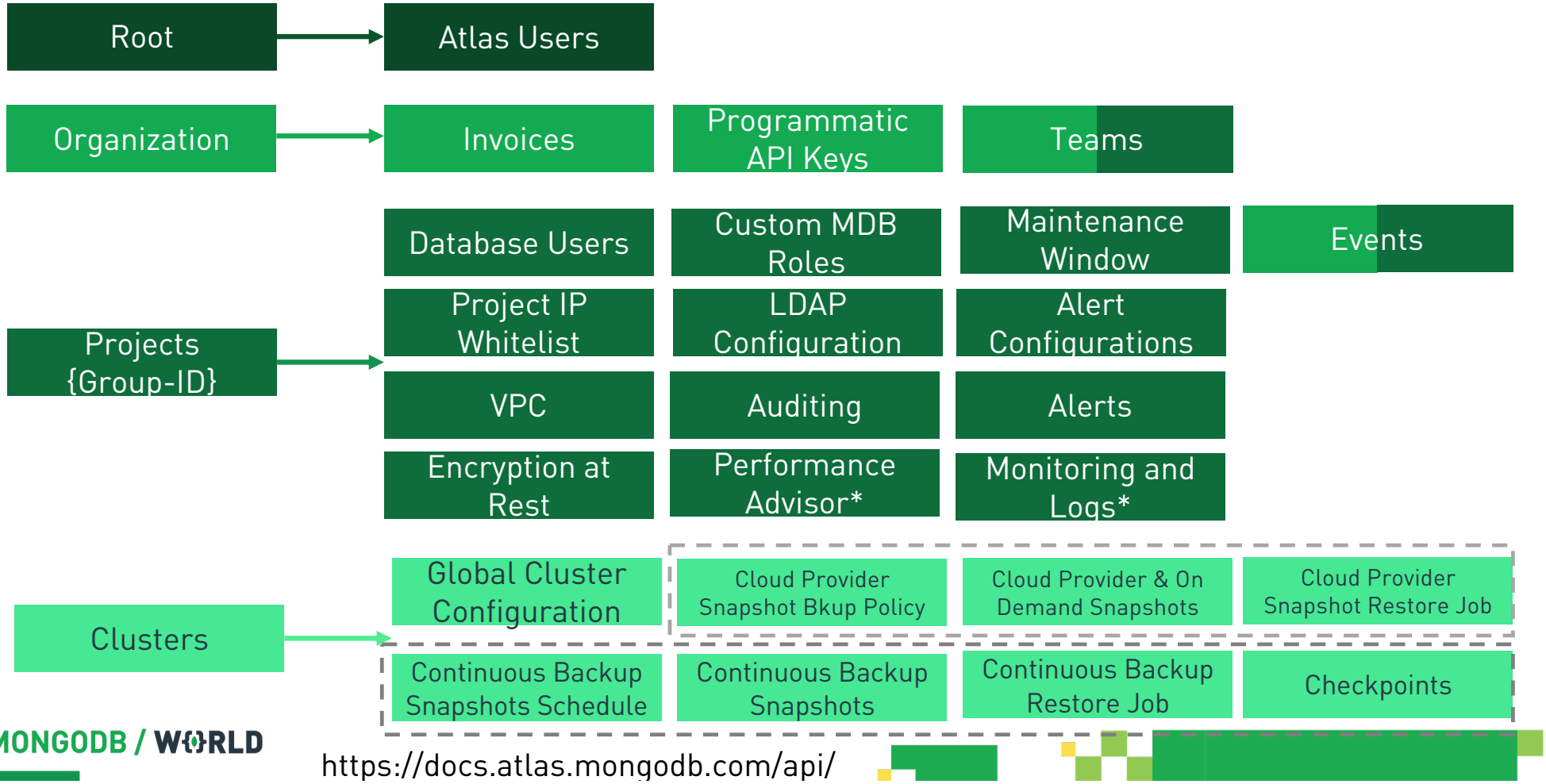
MongoDB Atlas – Exploring the API

MongoDB Atlas API means UI isn't required to do much of what we need to do repeatedly to support developers

- REST
- API key w/ Digest Auth over HTTPS
- API keys has RBAC - capabilities match the permissions assigned to the Key
- API key whitelist

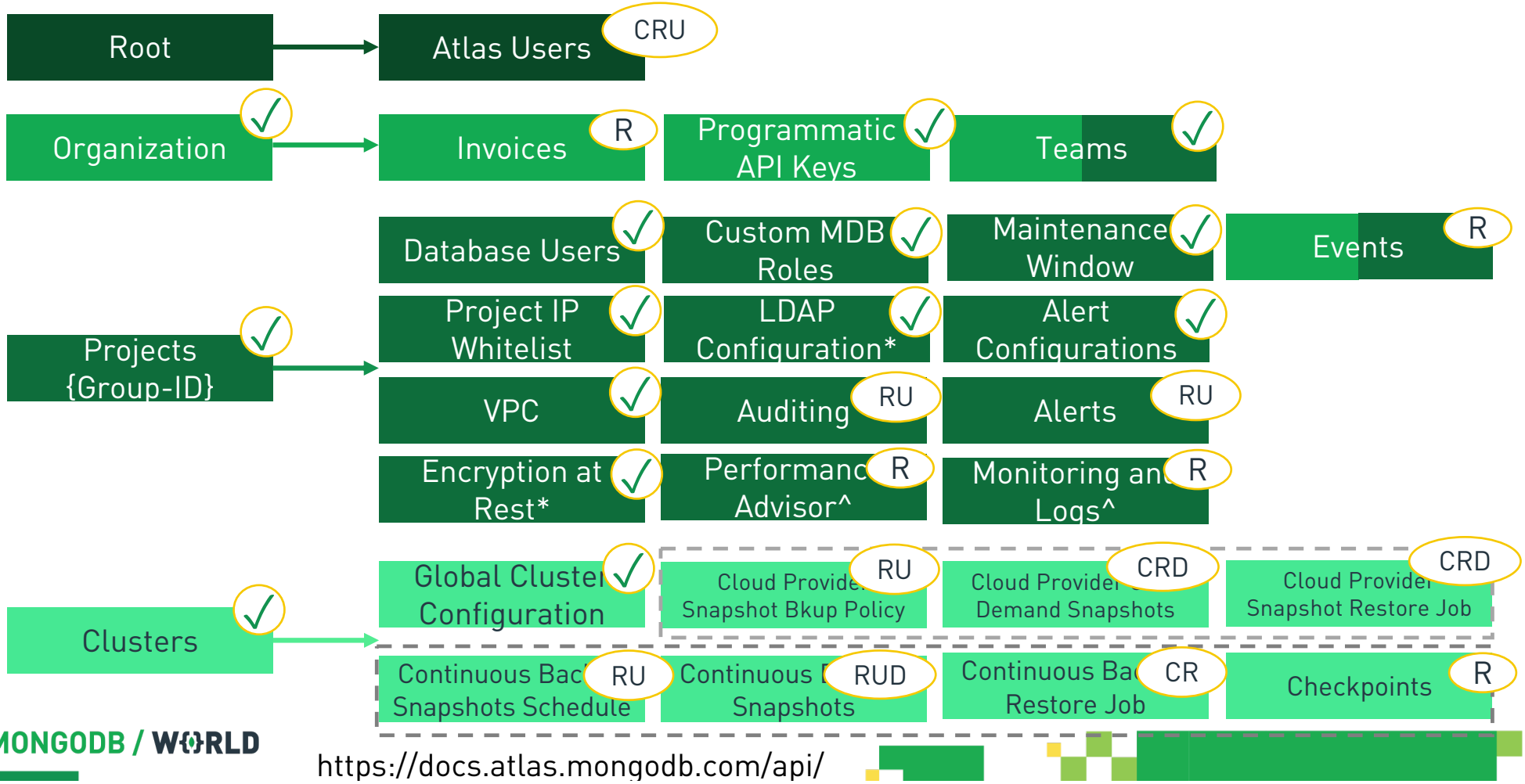
https://docs.atlas.mongodb.com/api/

MongoDB Atlas – Exploring the API - Resources



https://docs.atlas.mongodb.com/api/

MongoDB Atlas –API Resources Reference



https://docs.atlas.mongodb.com/api/

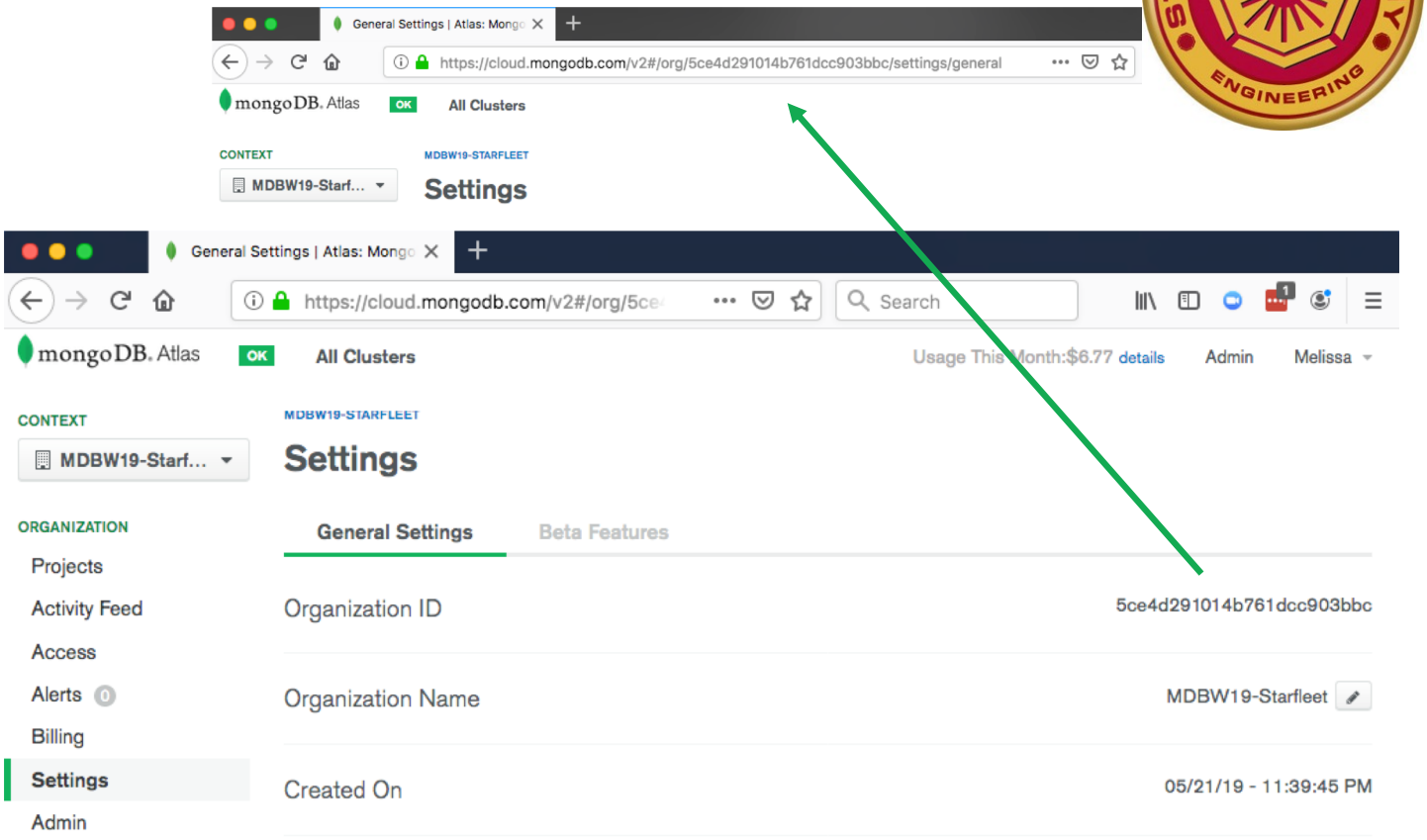
MongoDB Atlas – Exploring the API

Two key things to know the location of before you get started …

- Project ID
- Organization ID

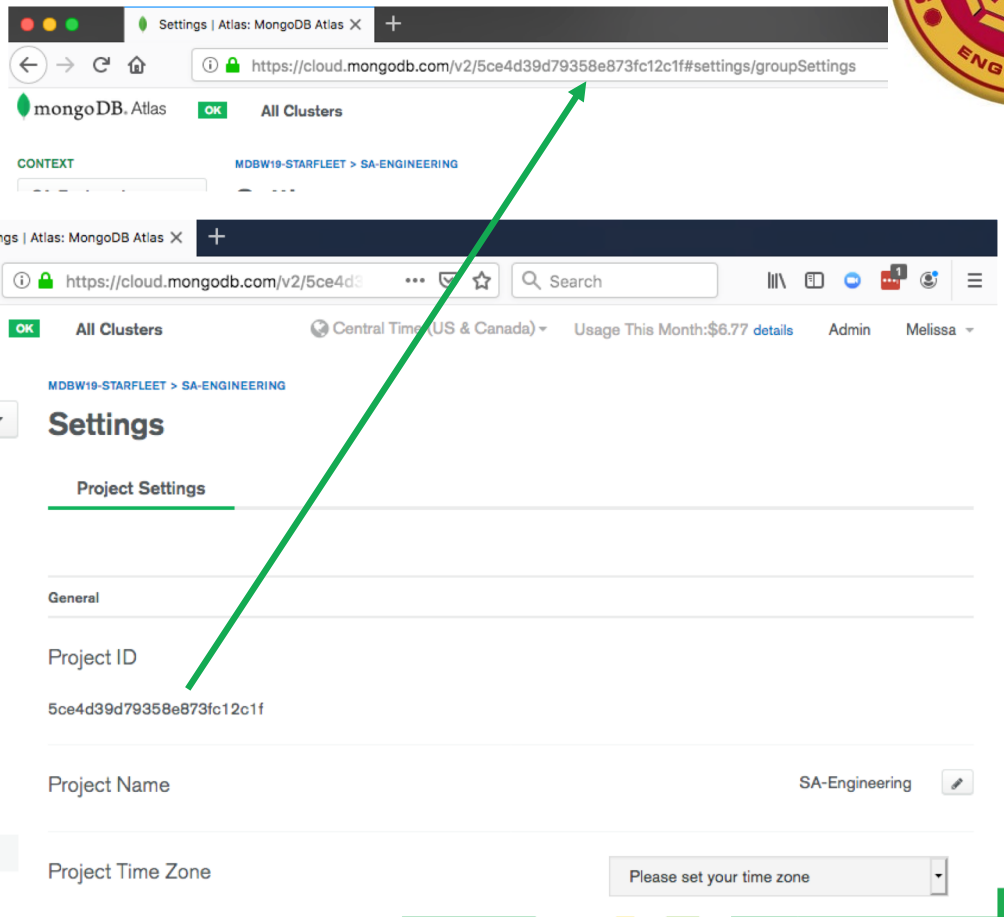
MongoDB Atlas – Exploring the API

Organization ID



MongoDB Atlas – Exploring the API

Project ID (aka Group ID)

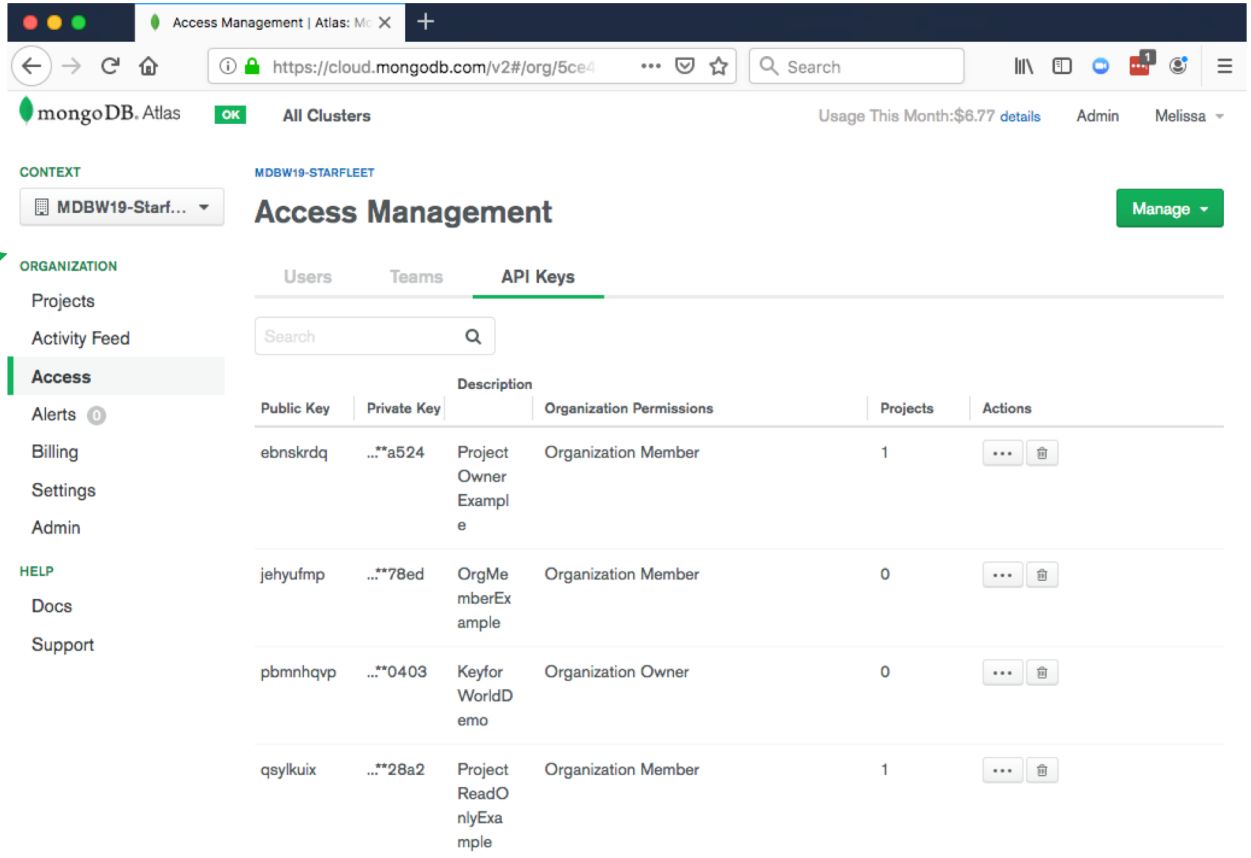


MongoDB Atlas – Exploring the API

Create a Programmatic API Key either at the Organization or Project level:

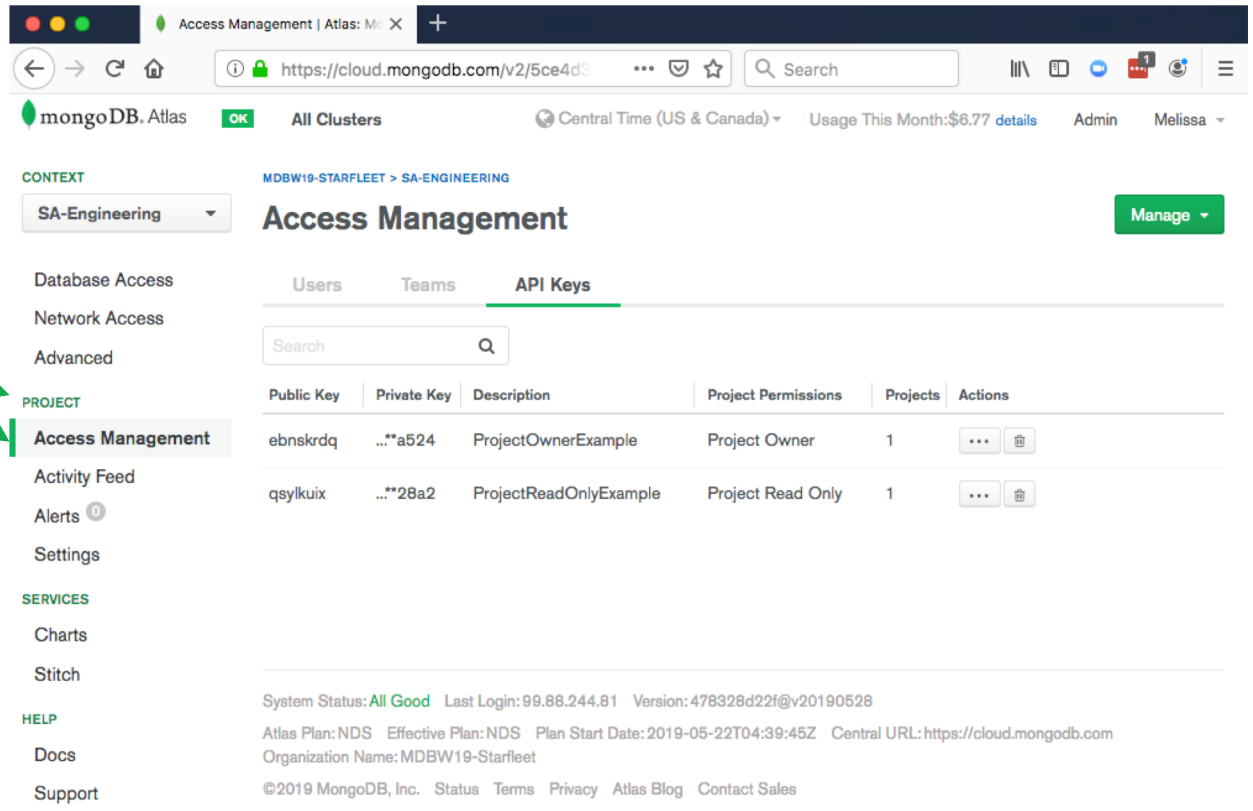
- Org level: all the available permissions are for the org level.
- Project level: all the available permissions are for the project level
  - BUT all project keys can be seen in the org level as an Org Member.

MongoDB Atlas – Exploring the API



@ Org level go to Access

MongoDB Atlas – Exploring the API



@ Project level go to Access Management

Create a Cluster:

```
--request POST
"https://cloud.mongodb.com/api/atlas/v1.0/groups/5ce4d39d79358
e873fc12c1f/clusters?pretty=true" \
--data '
    {
      "name" : "MDBW19-Class-Cluster2-API",
      "diskSizeGB" : 100,
      "autoScaling" : {
        "diskGBEnabled" : false
      }, "clusterType":"REPLICASET",
      "providerBackupEnabled" : true,
```

Create a Cluster:

```
"providerSettings" : {
  "providerName" : "AWS",
  "diskIOPS": 340,
  "instanceSizeName" : "M30",
  "volumeType" : "PROVISIONED” },
```

Create a Cluster:

```
"replicationSpecs" : [ {
 "numShards" : 1,
 "regionsConfig" : {
   "US_WEST_1" : {
      "analyticsNodes" : 1,
      "electableNodes" : 3,
      "readOnlyNodes" : 0,
      "priority" : 7},
```

Create a Cluster:

```
        "US_EAST_1" : {
            "analyticsNodes" : 0,
            "readOnlyNodes" : 1,
            "electableNodes" : 2,
            "priority" : 6 }
        }
    }]
}'
```

Create a MongoDB Database User in the Project:

```
-X POST
"https://cloud.mongodb.com/api/atlas/v1.0/groups/5ce4d39d79358
e873fc12c1f/databaseUsers?pretty=true" \
  --data '
  { "databaseName" : "admin",
    "roles" : [ {
      "databaseName" : "admin",
      "roleName" : "readWriteAnyDatabase"
    } ],
    "username" : "spock2",
    "password" : "badpass123” }'
```

Add an IP to the Project IP Whitelist:

```
--request POST
"https://cloud.mongodb.com/api/atlas/v1.0/groups/5ce4d39d79358
e873fc12c1f/whitelist?pretty=true" \
  --data '
    [
      {
        "ipAddress" : "192.0.0.15",
        "comment" : "IP address added via API"
      }
    ]'
```

Create a Quick Cluster via API

MongoDB Atlas – Exploring the API

API is great but...

- Requires us to really know the API: e.g. updating via PATCH, or delete via DELETE, etc.
- Going to possibly take a lot of time and ~~money~~.
- What if we could just describe what we want and change that when we need to modify it?

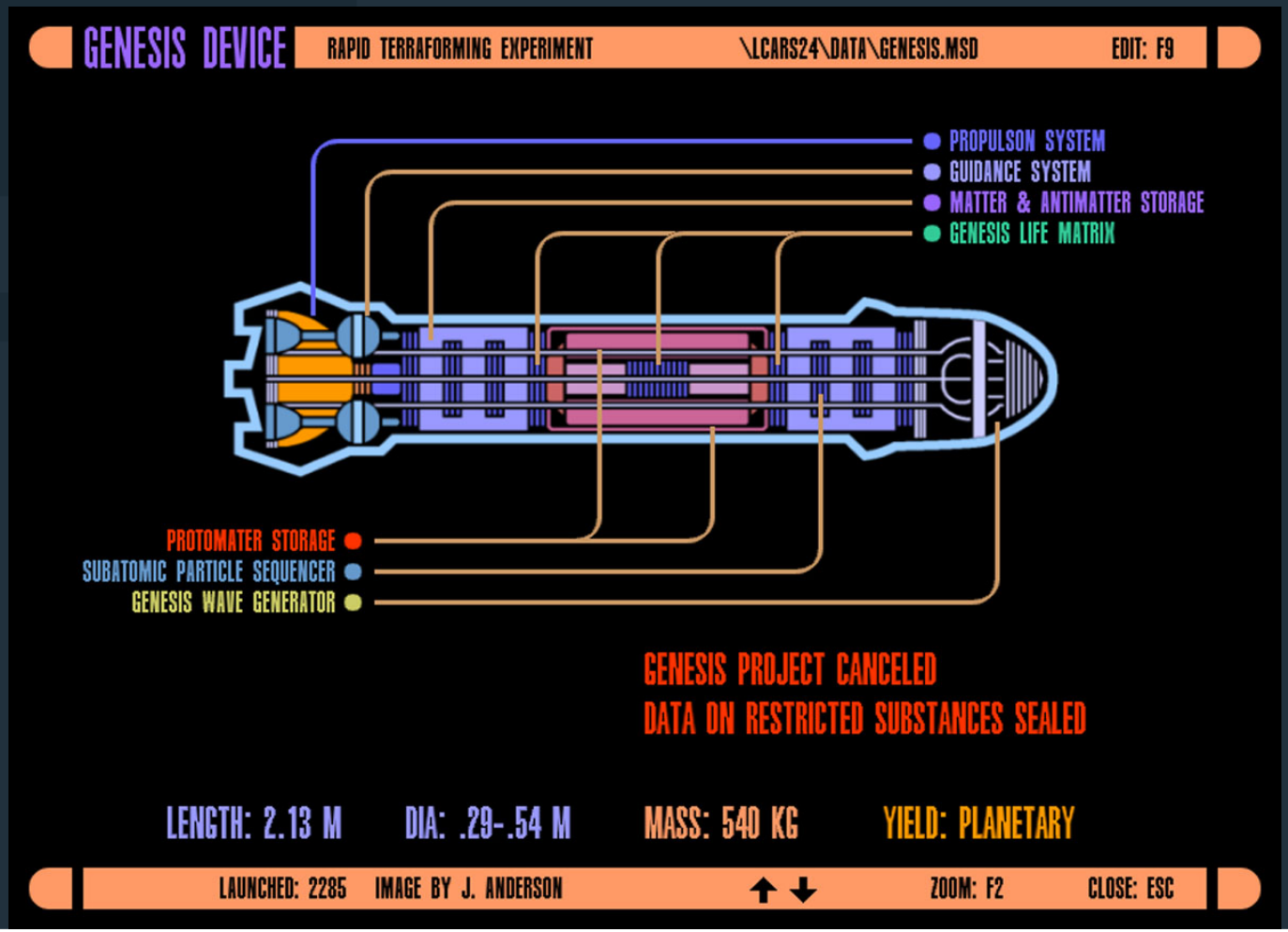
Emergency Transmission . . . .

Top Secret
From: Starfleet Command
To: Starfleet Engineering

MongoDB Cluster needed STAT. Project Genesis is at risk. Deploy at once!

Khan seen in sector. Red Alert recommended.

Emergency Transmission . . . .



HashiCorp's Terraform

Terraform is an open source, declarative Infrastructure as Code (IaC) tool.

- Describe desired infrastructure in a configuration file
- Terraform takes that file and creates a plan to implement it
- One can review the plan, and if all good, apply to create
- We can create, change and destroy infrastructure easily!

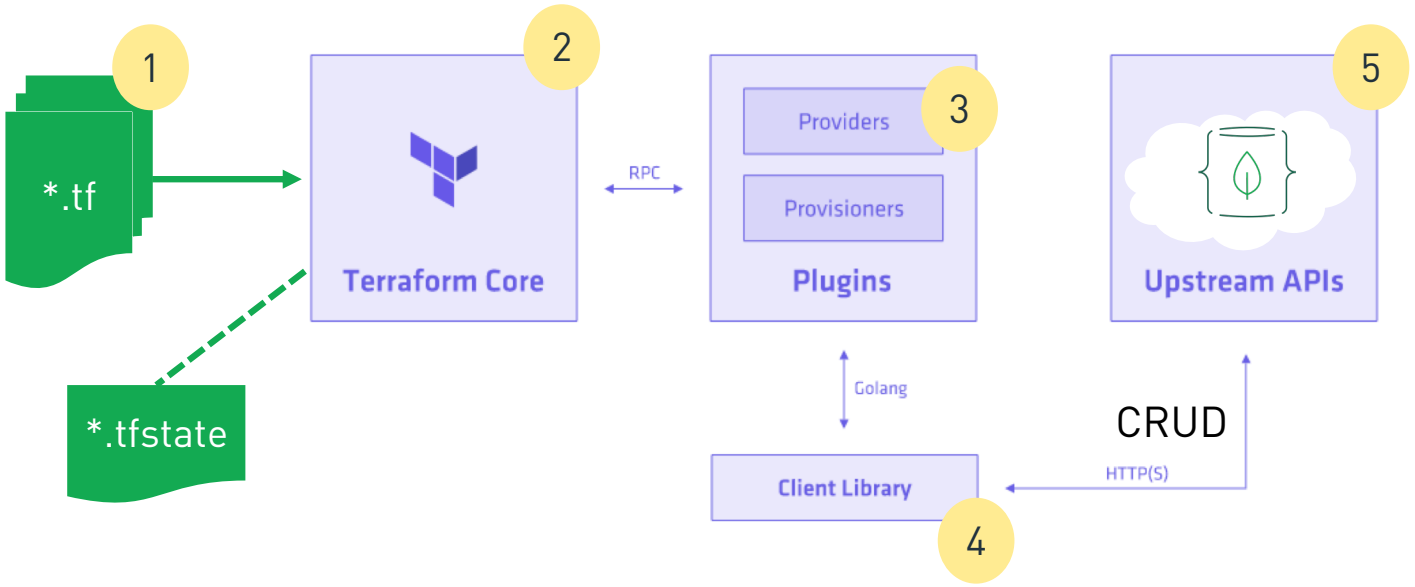
HashiCorp's Terraform

We can change and destroy infrastructure easily???

- Terraform keeps a state file of what it has done
- Change your configuration it only implements the diff
- Can import a resource and then apply changes, e.g. import in a cluster and then set it to a bigger size.
- Terraform destroy really destroys!

HashiCorp's Terraform

Terraform is a plugin based system:



The Provider understands both Terraform and the Upstream API

Terraform Core doesn't "know" any infrastructure, that's the Plugins purpose.

You simply need to define what you want in the .tf file, do not need to know the API deeply

Base diagram from hashicorp.com

Main.tf - Variables

```
variable "mongodb_atlas_api_pub_key"
        { default = ”PUB-API-KEY"}
variable "mongodb_atlas_api_pri_key"
        { default = ”PRI-API-KEY" }

variable "database_username" { default = "spock3" }
variable "database_user_password" { default = "blahblah1236" }
variable "mongodb_atlas_whitelistip” { default = "192.155.1.1" }

variable "mongodb_a
variable "mongodb_a
}
```

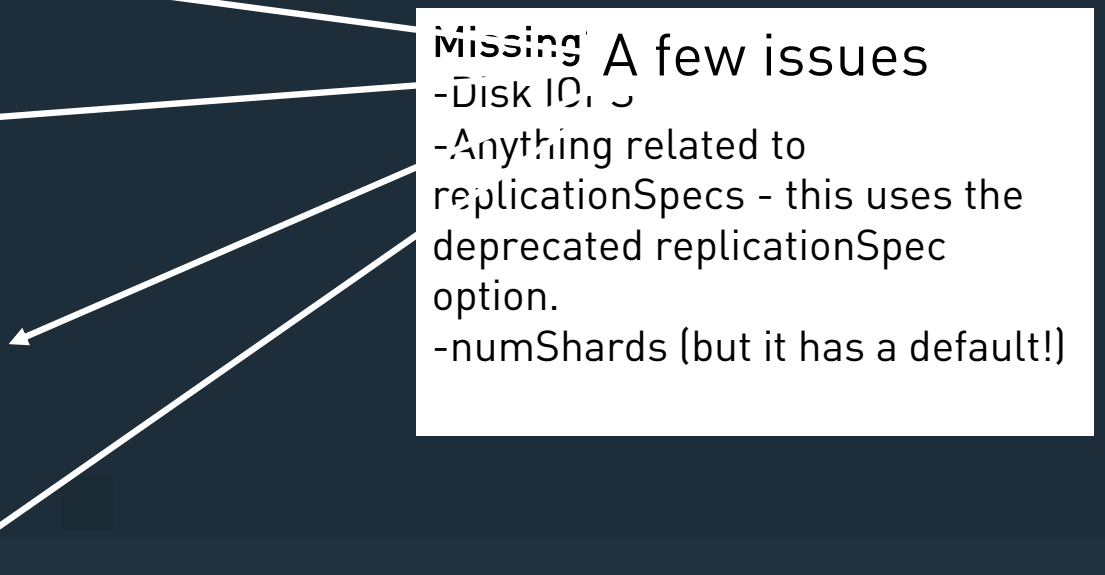
Keys and passwords !?
Not a great practice and angers Admiral Kirk as Khan could steal these ☹
But we’ll address this soon.

Main.tf – Configure the Provider

```
# Configure the MongoDB Atlas Provider
provider "mongodbatlas" {
  username = "${var.mongodb_atlas_api_pub_key}"
  api_key = "${var.mongodb_atlas_api_pri_key}"
}
```

Main.tf - Cluster

```
resource "mongodbatlas_cluster" "cluster" {
  name                    = "MDBW19-Class-Cluster3-TF"
  group                   = "${var.mongodb_atlas_project_id}"
  mongodb_major_version = "4.0"
  provider_name           = "AWS"
  region                  = ""
  size                    = "M30"
  disk_size_gb            = 100
  backup                  = false
  provider_backup         = true
  disk_gb_enabled         = false
  replication_factor      = 0
```



Main.tf – Cluster Continued

```
replication_spec {
    region          = "US_WEST_1"
    priority        = 7
    read_only_nodes = 0
    analytics_nodes = 1
    electable_nodes = 3
  }
```

```
 replication_spec {
    region          = "US_EAST_1"
    priority        = 6
    read_only_nodes = 1
    analytics_nodes = 0
    electable_nodes = 2
  }
}
```

Main.tf – Database User

```
# Create a Database User
resource "mongodbatlas_database_user" "test" {
  username = "${var.database_username}"
  password = "${var.database_user_password}"
  database = "admin"
  group    = "${var.mongodb_atlas_project_id}"

  roles {
    name = "readWriteAnyDatabase"
    database = "admin"
  }
}
```

Main.tf – IP Whitelist

```
# Create an IP Whitelist
resource "mongodbatlas_ip_whitelist" "test" {
  group      = "${var.mongodb_atlas_project_id}"
  ip_address = "${var.mongodb_atlas_whitelistip}”
  comment    = "Added with Terraform"
}
```

HashiCorp's Terraform

Let's configure a cluster, MongoDB user and Project IP whitelist with Terraform

- Providers can be verified/official (both Hashicorp & Community created) OR community created but not verified
- MongoDB Atlas Community Provider created by Akshay Karle: https://github.com/akshaykarle/terraform-provider-mongodbatlas/ (Thank you Akshay!)

Create a Quick Cluster via Terraform

Cadets Save Day and Defeat Khan!

Security of the Mission

We have to ensure we handle data securely. Security layers we have utilized thus far:

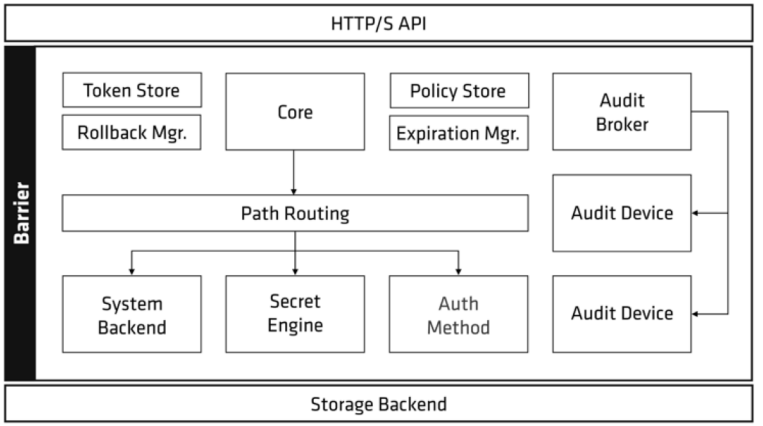
- API communication over HTTPS
- RBAC to limit what the API key can do
- IP Whitelist

But the more secure layers the better so what else can we do?

HashiCorp's Vault

Vault is another HashiCorp product designed for security in the Cloud:

- Manage secrets & protect sensitive data
- Focus here - managing secrets, especially dynamic secrets
- Secret Engine extends Vault to systems, e.g. physical like a HSM or a service in the Cloud like Atlas.



HashiCorp's Vault

- Database Secrets Engine: generate database credentials dynamically based on configured roles, including for MDB.
- Atlas creates database users differently (via API) so need a Secrets Engine for that.
- Ta da! There's a community Secrets Engine at https://github.com/mealal/vault-atlas-plugin written by the amazing Alexey Menshikov, a Consulting Engineers @MDB!

HashiCorp's Vault

- Atlas community Secrets Engine examples:

```
$ vault write database/roles/readonly db_name=atlas
creation_statements='{ "db": "admin", "roles": [{ "role":
"readAnyDatabase" }] }' default_ttl="1h" max_ttl="24h"

$ vault write database/config/atlas plugin_name=atlas
allowed_roles="readonly" apiID="public API key"
apiKey="private API key" groupID="project id"

$ vault read database/creds/readonly
```

HashiCorp's Vault

- What about a Provider for Vault? Yes! https://www.terraform.io/docs/providers/vault/index.html
- Read the cautions on using the Provider for Vault and follow the best practices to be as secure as possible!

Cadets Save Day and Defeat Khan!

Future Mission Plan

MongoDB + Hashicorp – Better together!

Later in 2019 MongoDB will have an official:

- MongoDB Atlas Terraform Provider
- MongoDB Atlas Secrets Engine for Vault

Be the First in the Know!

- Go to https://bit.ly/2WS4WMJ
- Fill out the brief survey, 6 required q's, 3 not! < 2m
- You will be notified on the progress for which ever mission you are interested in (Vault/Terraform/both)

Questions?

Where: Atlas Booth in the Partner Pavilion (A1)

When: 1:40 - 5:05 PM today!

or

Melissa.Plunkett@mongodb.com anytime!

Github: themantissa

YOU ARE IN REGENT

Please provide Session Feedback

1. MDB World App -> Menu -> “Rate a Session” -> Regent

OR

1. Go to slido.com

2. Enter event code #MDBW19

3. Click on Regent

Feedback poll will remain open for 10 minutes after the talk ends

Thank you!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