12 Factor Apps in Heroku to Feature your Work in any Language

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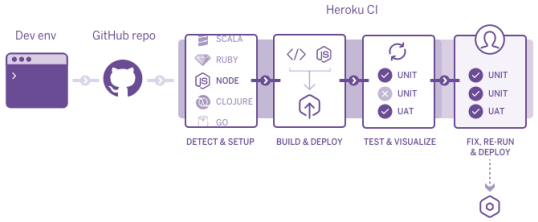
https://tinyurl.com/NFJSHeroku

https://www.productivecloudinnovation.com/lessons

HEROKU

Design Principles
12 Factor Apps



Heroku CI

Heroku Use cases

Heroku Private Spaces

Heroku Connect

Configuration

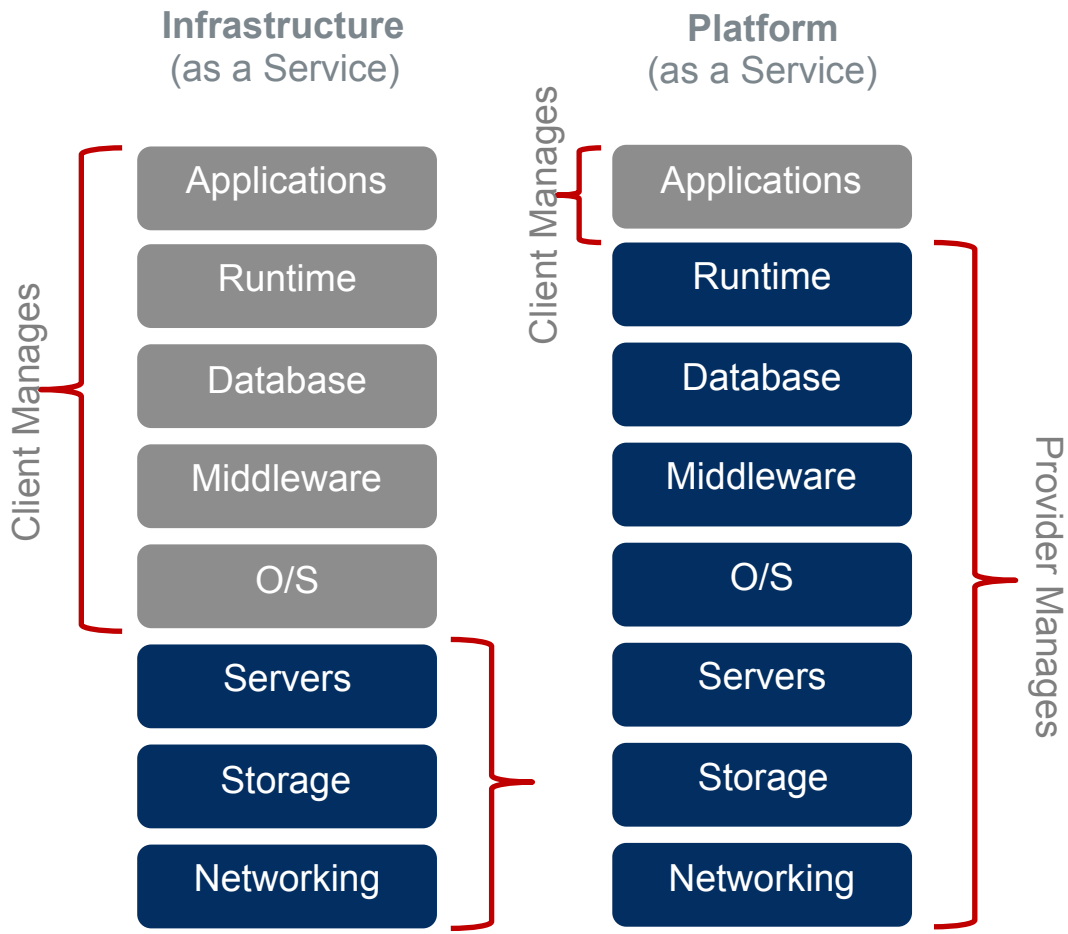
What is Heroku?

Heroku is a Service

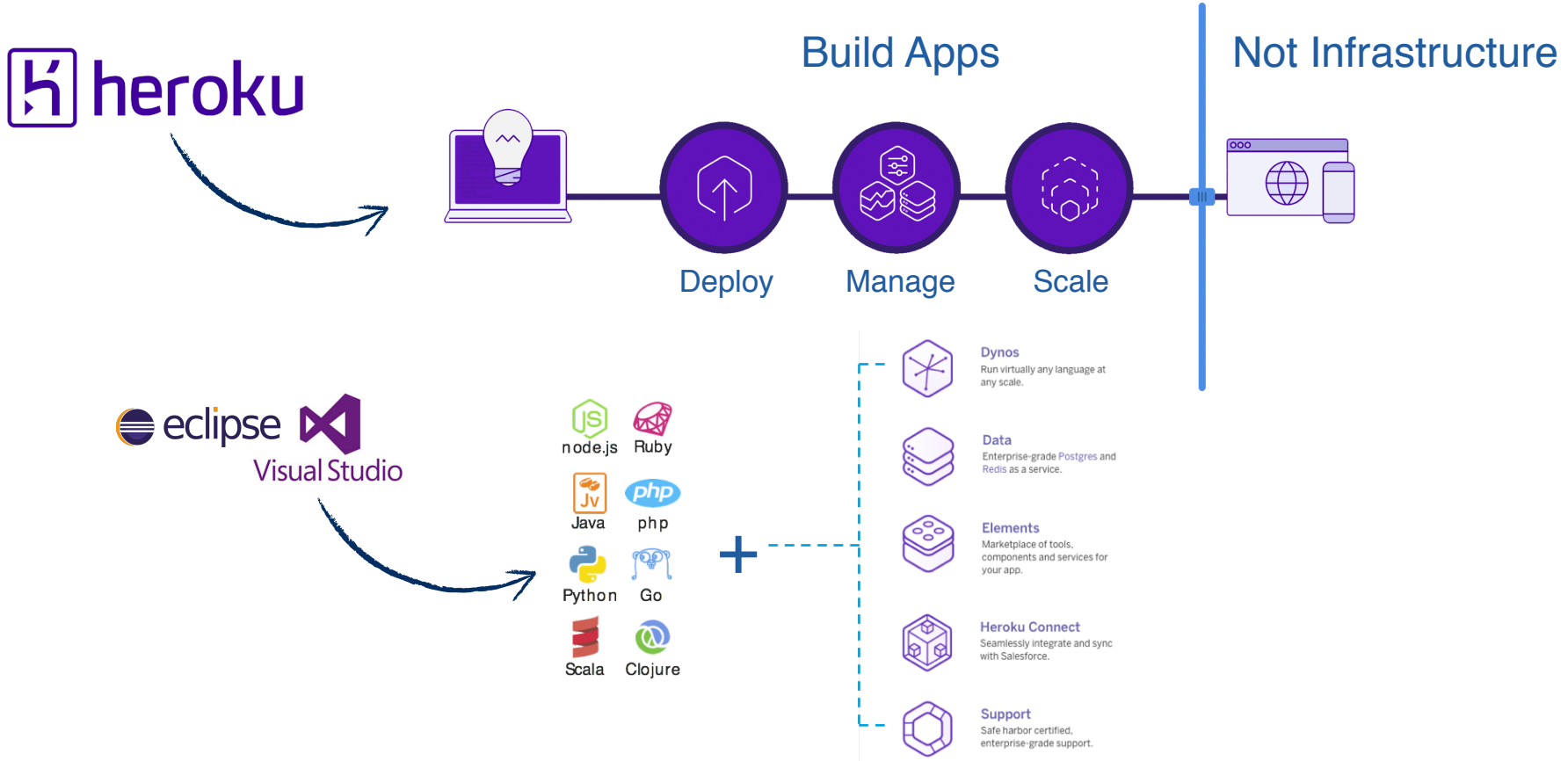
Heroku is a Service

salesforce heroku

- **Accelerate Developer Productivity**
  Accelerate time to market through a rich set of app and data services
- **Lower Operational Complexity**
  Reduce cloud operations overhead by letting Salesforce manage your platform for you
- **Connect to Salesforce**
  Heroku Connect provides simple, high-performance bidirectional sync with your Salesforce data



Build Great Applications



Use any Dev Tool
(open to enterprise)

Pick your Language
(over 900 buildpacks)

Leverage our Elements
(over 150 Add-On Services)

Scale with Heroku
(simply with transparency)

Introduction

- https://tinyurl.com/NFJSHeroku

Powered by Amazon

#1 IaaS

64.3%
Lower TCO

68.1%
More efficient IT staff operations

$76,800
Additional revenue per year per application

118.4%
More applications delivered

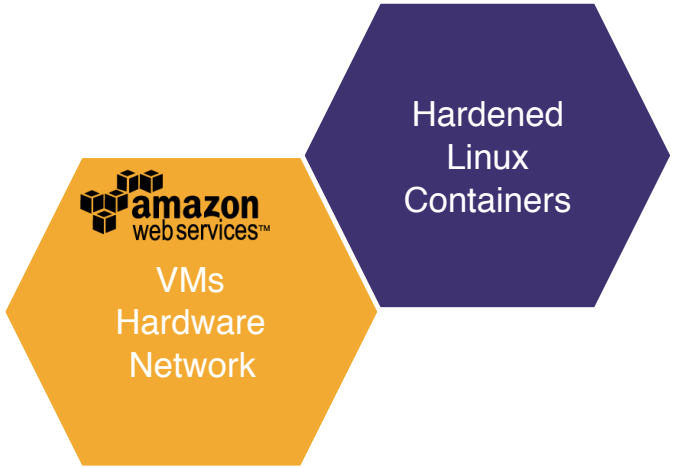
81.7%
Less downtime

Compared to on-premises infrastructure (IDC, 2015)

Focus: Developer productivity with Enterprise control and security

Developer PaaS on AWS

salesforce heroku

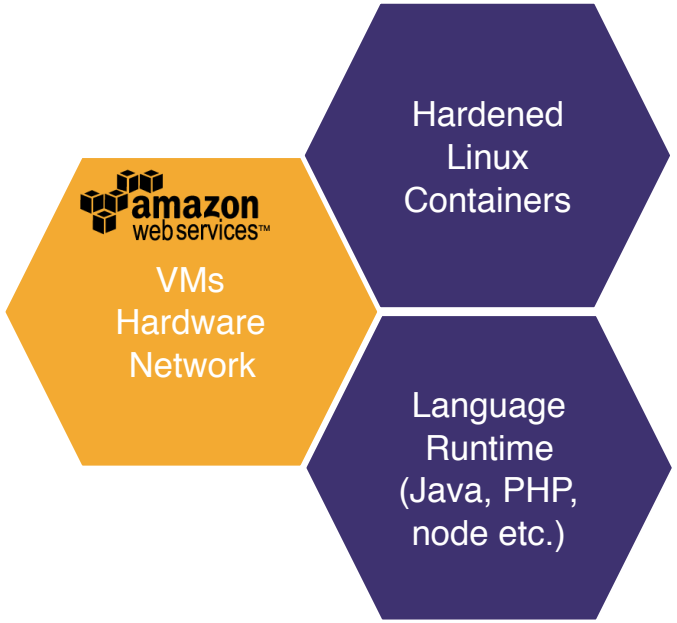


- Secure runtime environment
- Auto-scaling
- Private or multi-tenant
- 512MB to 14GB
- Patched and monitored
- We manage the container SERVICE so you don't have to build and manage one.

Focus: Developer productivity with Enterprise control and ***security***

Developer PaaS on AWS

salesforce heroku



Automatically deployed

8 managed by Heroku

4,100 open source

You have 100% control

Patched and monitored

We manage the runtime SERVICEs so you don't have to build and manage them.

*Focus: Developer **productivity** with Enterprise control and **security***

Developer PaaS on AWS

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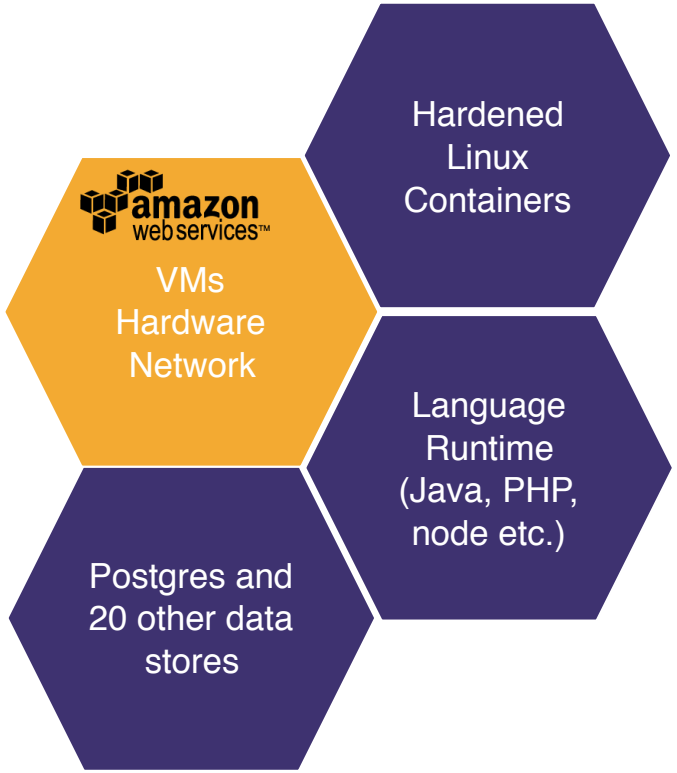

- One click deploy
- Free trial plans
- Mix and match as needed
- Automatic backups
- Visual performance tools
- 1.2M clusters in our fleet
- Patched and monitored
- We manage the database SERVICEs so you don't have to build and manage them.

*Focus: Developer **productivity** with Enterprise **control** and **security***

Developer PaaS on AWS

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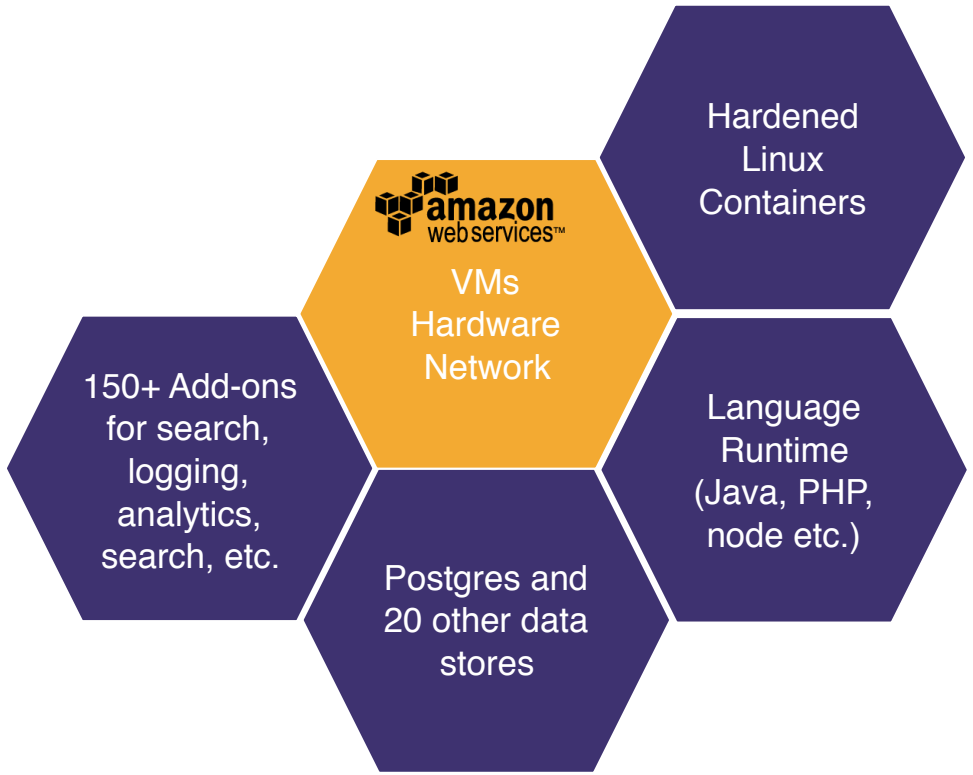
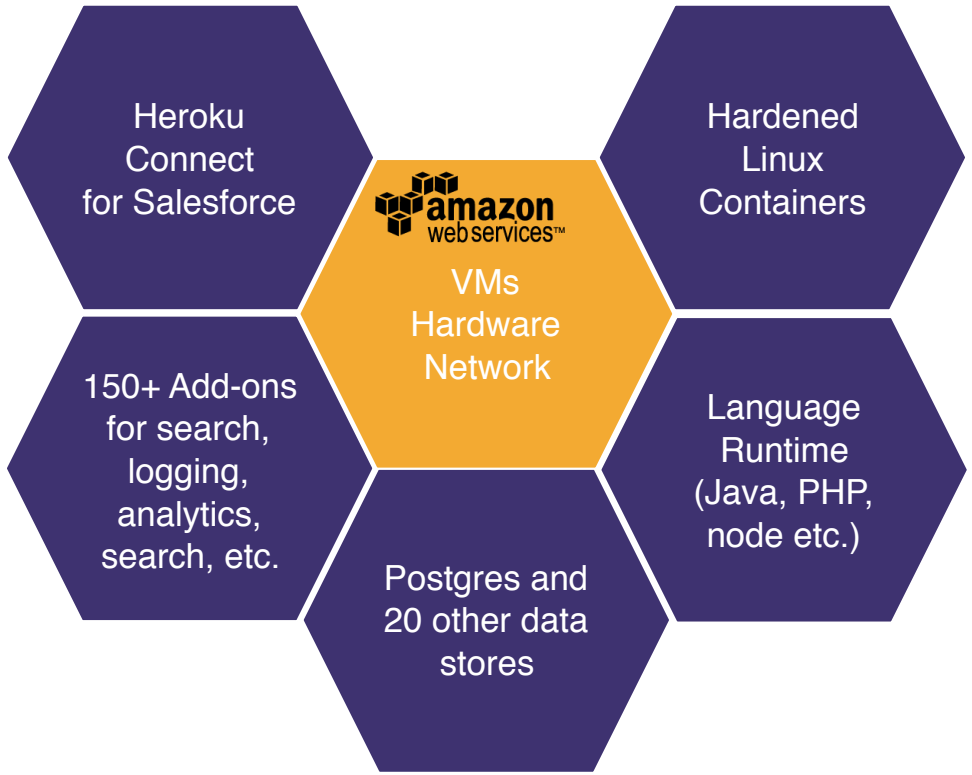


- One click deploy
- Free trial plans
- Curated for customer / consumer apps
- Make smart architecture choices early in dev
- Simple scale-up for test and production
- Patched and monitored
- We manage the Add-on SERVICEs so you don't have to build and manage them.

Developer PaaS on AWS

salesforce heroku



- Data synchronization with Lightning Platform
- One click deploy
- Scalable cloud service
- No Code setup
- Avoids Lightning API Transaction limits
- Patched and monitored
- We manage the integration SERVICE so you don't have to build and manage one.

Operated by Salesforce

salesforce heroku

- Manage entire app portfolio
- Continuous Integration
- Continuous Delivery
- Control access to apps
- Control access to dev, prod, test
- Manage costs and resources
- Patched and monitored
- We manage the CI/CD and ALM SERVICEs so you don't have to build and manage them.

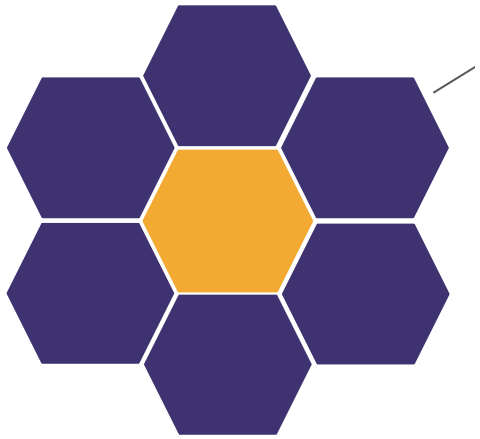
Lower Operational Complexity

Generating more revenue by addressing business opportunities with more tailored business applications in less time

Driving higher user productivity through earlier delivery of high-performing business applications that leverage business data

Increasing the productivity of application development teams by providing an easy-to- use, robust application development platform

Optimizing the use of IT staff time and IT infrastructure by using the cloud-based Salesforce platform-as-a-service solution



50%
faster application development life cycle

59%
less time to release new application or feature

38%
more efficient IT infrastructure management

44%
more new apps developed per year

478%
five-year ROI

7 month
breakeven point

(IDC, 2016)

Node JS Exercise

- https://tinyurl.com/NFJSHeroku

app.json

Branch: master ▾ flow-demo / app.json Find file Copy path

 rohitbhardwaj added all files 78c7be0 22 hours ago

1 contributor

Executable File | 18 lines (17 sloc) | 197 Bytes Raw Blame History

```
{
  "name": "sample-node-app",
  "scripts": {
  },
  "formation": {
    "web": {
      "quantity": 1
    }
  },
  "addons": [

  ],
  "buildpacks": [
    {
      "url": "heroku/nodejs"
    }
  ]
}
```

https://devcenter.heroku.com/articles/app-json-schema

Heroku is a Service – You are in charge of service

Heroku is a Service that enables Customers to spend their time developing and delivering apps that immediately start producing value.

IT's Included with the Service

Patch security vulnerabilities (DROWN OpenSSL, Heartbleed: same day remediation)

Auto-fail over apps and databases

Auto-cluster all apps

Ensure 100% consistency between dev, test, stage, prod

Maintain 99.99+% availability (https://status.heroku.com/uptime)

Enforce 2-Factor authentication

White list services available by project (e.g. Elasticsearch, Redis, Hadoop)

Report on and enforce resource consumption and spend by app

Deliver zero touch world class DBA services

Salesforce Platform

salesforce lightning

salesforce heroku

Sales Service Marketing Community Analytics

SaaS

Apps

aPaaS

APPEXCHANGE

ELEMENTS

DECLARATIVE DEVELOPMENT

Schema Builder | App Builder | Process Builder | Page Builder

Community Builder | Sharing & Permissions | Collaboration | Global Search

Workflow Engine | Encryption | Reports & Dashboards | Auto Updates

DEVELOPER EXPERIENCE

COMPLETE CRM + CUSTOM SCHEMA

Salesforce1 Mobile | Identity | Files & Content

HEROKU CONNECT

DATA SERVICES

PostgreSQL redis

SOAP | REST | Bulk | OData 4.0 | Tooling | APIs & TOOLs | Metadata | CLI Sandbox | IDE | Dev Console

Unmatched Application-level Security

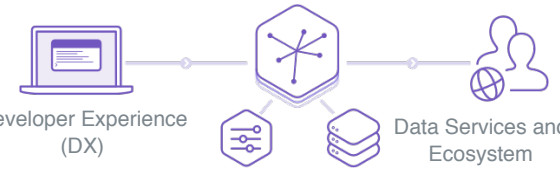
Unmatched Infrastructure-level Security

TRUST

Trusted Networks | Authentication Options | Object Level Security | Field Level Security | Audit Trail Object History Tracking

Firewall | SSL Accelerators | Load Balancers | Web/App Servers | Database Servers

Runtime

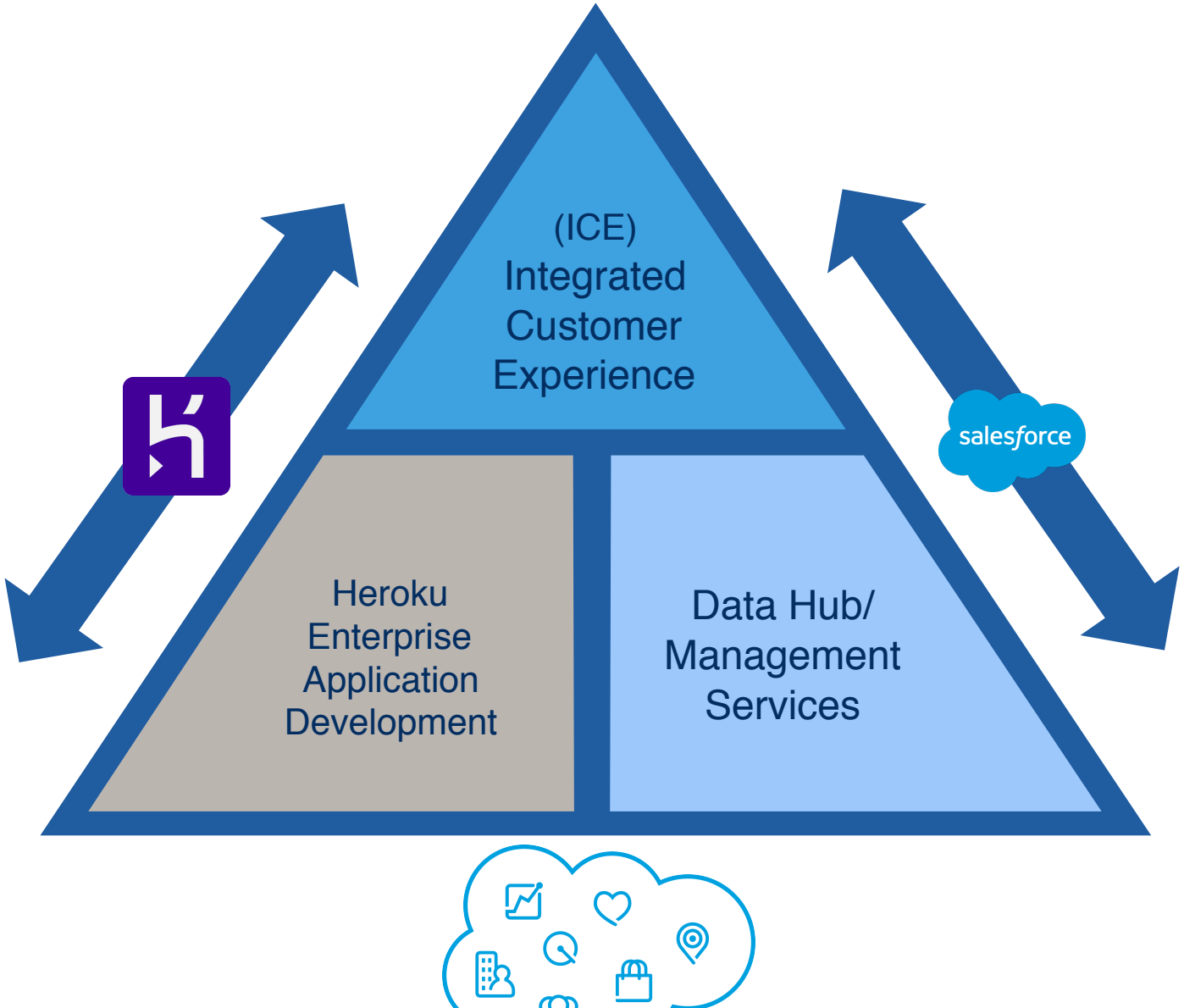


PaaS

No Code / Low Code
Solve for the Developer Gap

Pro Code
Build Innovative, Engaging Apps

Go-to-Market Model



Heroku is a Platform

Heroku is a Platform which enables developers to go from zero to H E R O.

Fast!

What is Heroku?

Heroku is a Platform

- Heroku is a Service

Heroku is a Platform

Heroku is a cloud platform based on a managed container system, with integrated data services and a powerful ecosystem, for deploying and running modern apps.

Build, deliver, monitor, and scale

Heroku is a Platform

- managed containers

Dynos

The building blocks that power any Heroku app — Dynos are lightweight, isolated environments that provide compute, memory, an OS, and an ephemeral filesystem.

Build, deliver, monitor, and scale

Heroku is a Platform

- managed containers
- integrated data services

Data

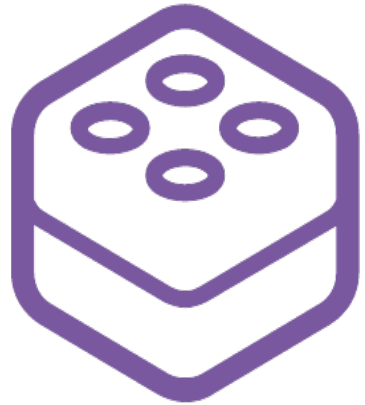
Heroku provides four fully-managed Data Service Add-ons

- ✓ Heroku Postgres
- ✓ Heroku Redis
- ✓ Heroku Kafka
- ✓ Heroku Connect

Build, deliver, monitor, and scale

Heroku is a Platform

- managed containers
- integrated data services
- powerful ecosystem



Add-ons

With over 150+ fully-managed cloud services for building, operating, or managing apps, Add-ons are 3rd party cloud services that developers can use to immediately extend their apps with a range of functionality such as data stores, logging, monitoring and more.

Build, deliver, monitor, and scale

Managed Containers

- Run any language, with support for Ruby, Node, Java, Python, PHP, Go, Scala, and Clojure
- Isolated, virtualized Linux containers
- Elastic scalability
- Dyno Manager ensures HA and routing
- Restarted every 24 hours, for that “fresh server” smell

Dynos, and meshes, and routing – oh my!

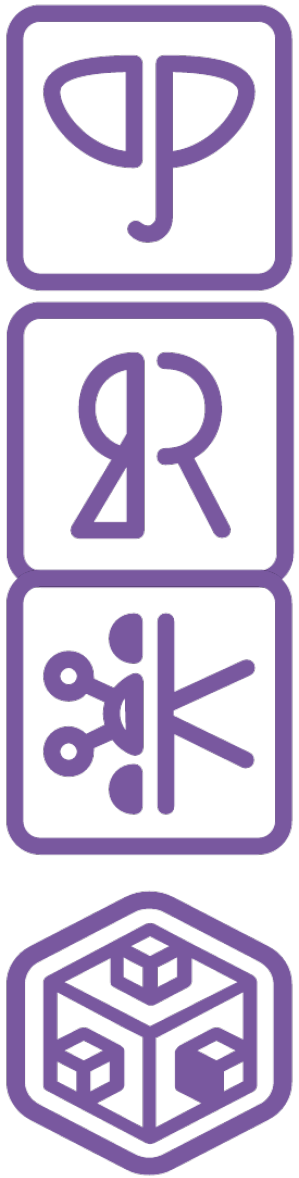
Integrated Data Services

Data

Postgres, Redis, Kafka, Connect – all Heroku

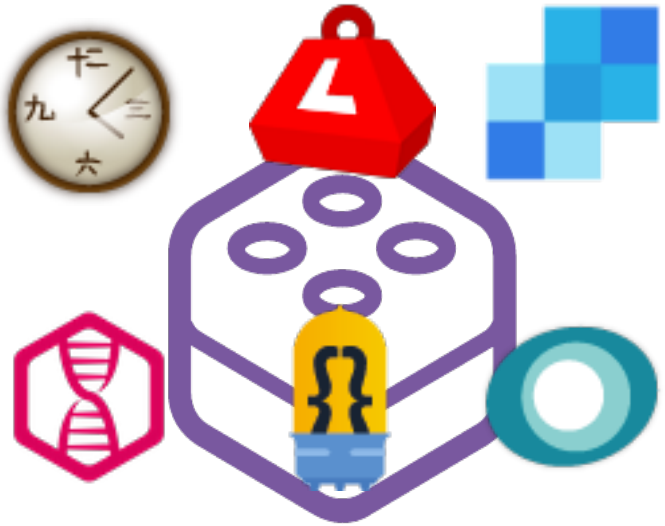
Integrated Data Services

- Heroku Postgres – single-tenant, industrial strength relational database that is HIPAA and PCI compliant
- Heroku Redis – in-memory key-value store as a Service
- Apache Kafka on Heroku - a durable, distributed message broker
- Heroku Connect – data bridge to Salesforce



Postgres, Redis, Kafka, Connect – all Heroku

Powerful Ecosystem



Add-ons

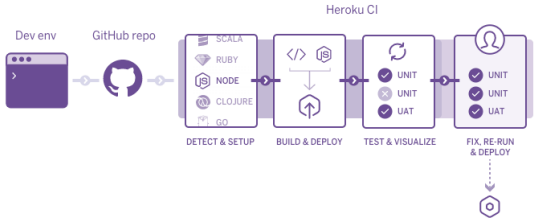
Add-ons are fully managed cloud services to help you develop, operate, and manage your apps.

- One-click install
- Integrated billing
- Centralized management
- Freemiums let you try before you buy

Many hands make light work, and build apps faster

HEROKU

Design Principles
12 Factor Apps



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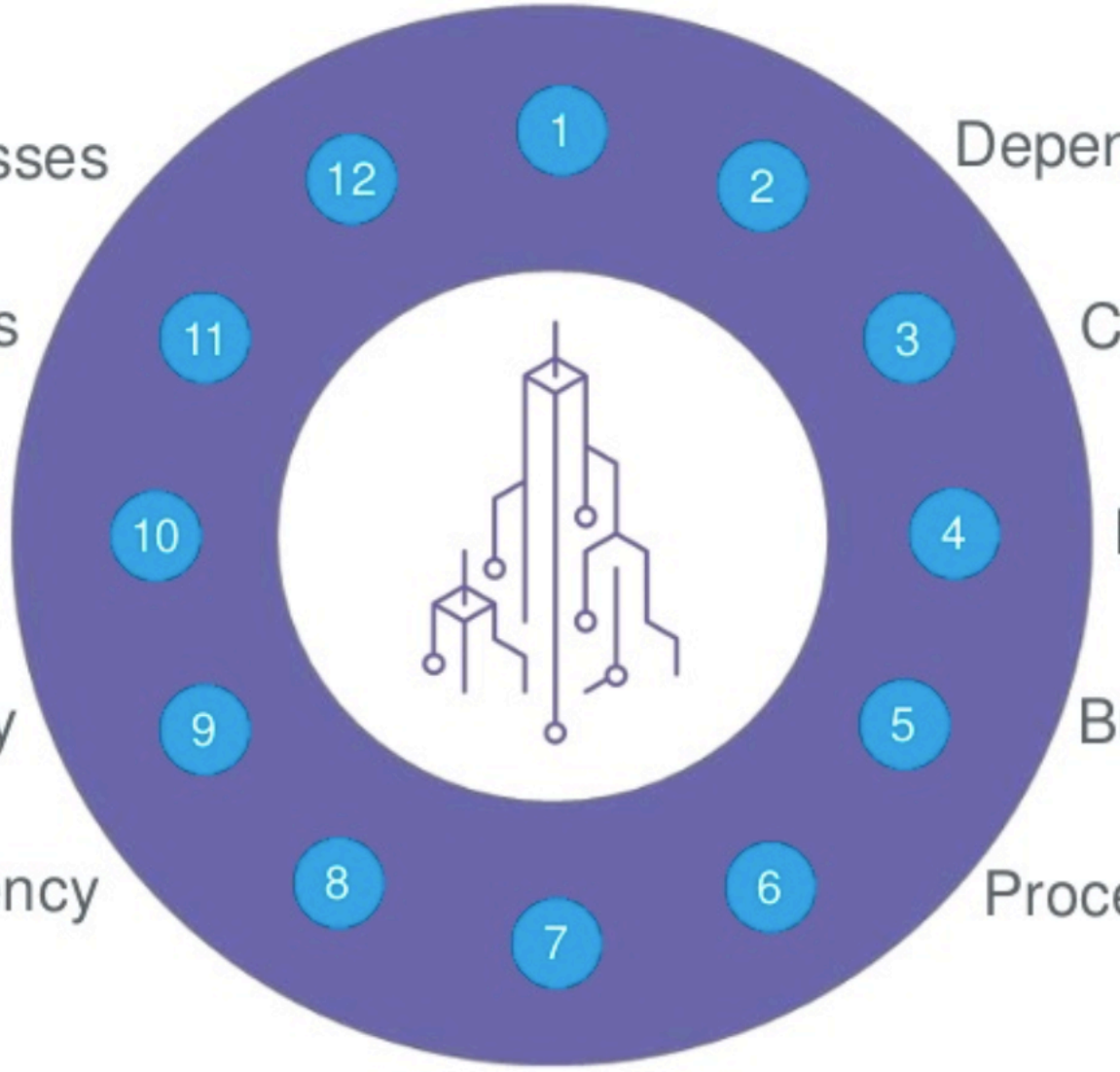
Design Principles
12 Factor Apps

12 Factor App

- Use **declarative formats** for setup automation, to minimize time and cost for new developers joining the project
- Have a **clean contract** with the underlying operating system, offering maximum portability between execution environments;
- Are suitable for **deployment** on modern **cloud platforms**, obviating the need for servers and systems administration;
- **Minimize divergence** between development and production, enabling **continuous deployment** for maximum agility;
- And can **scale up** without significant changes to tooling, architecture, or development practices.

Enter Twelve-Factors



Codebase

Dependencies

Configuration

Backing Services

Build, Release & Run

Process

Port Binding

Concurrency

Disposability

Dev, Prod Parity

Logs

Admin Processes

1. Codebase

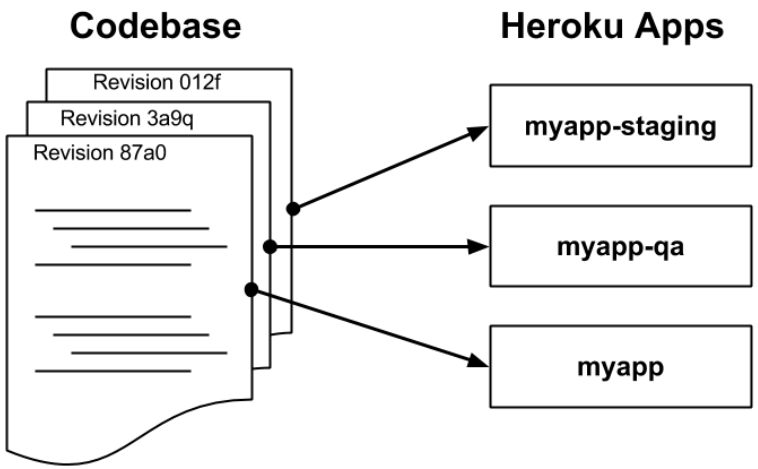
Git, GitHub, SVN etc.

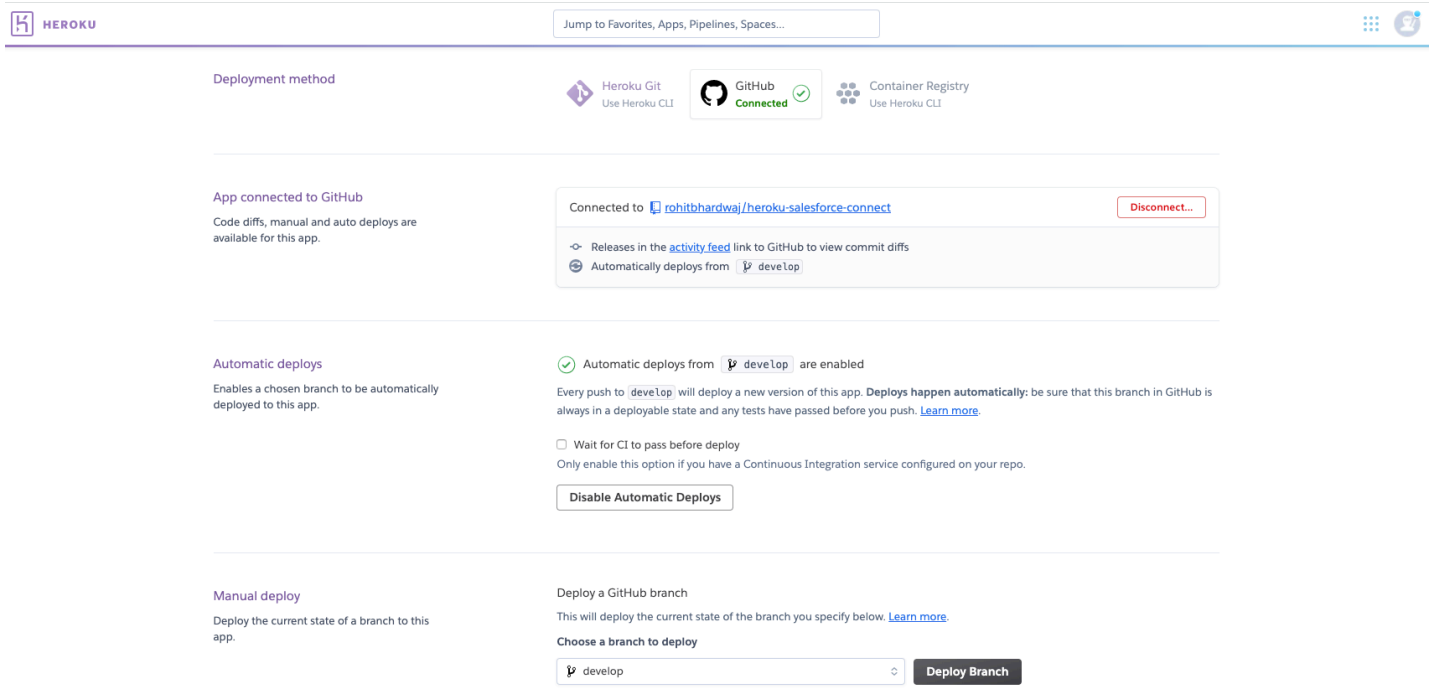
Code base in single repository

App is single codebase

Many apps should not share same code base

Create shared Libraries & Frameworks





2. Dependencies

Automate dependencies with tools & package managers

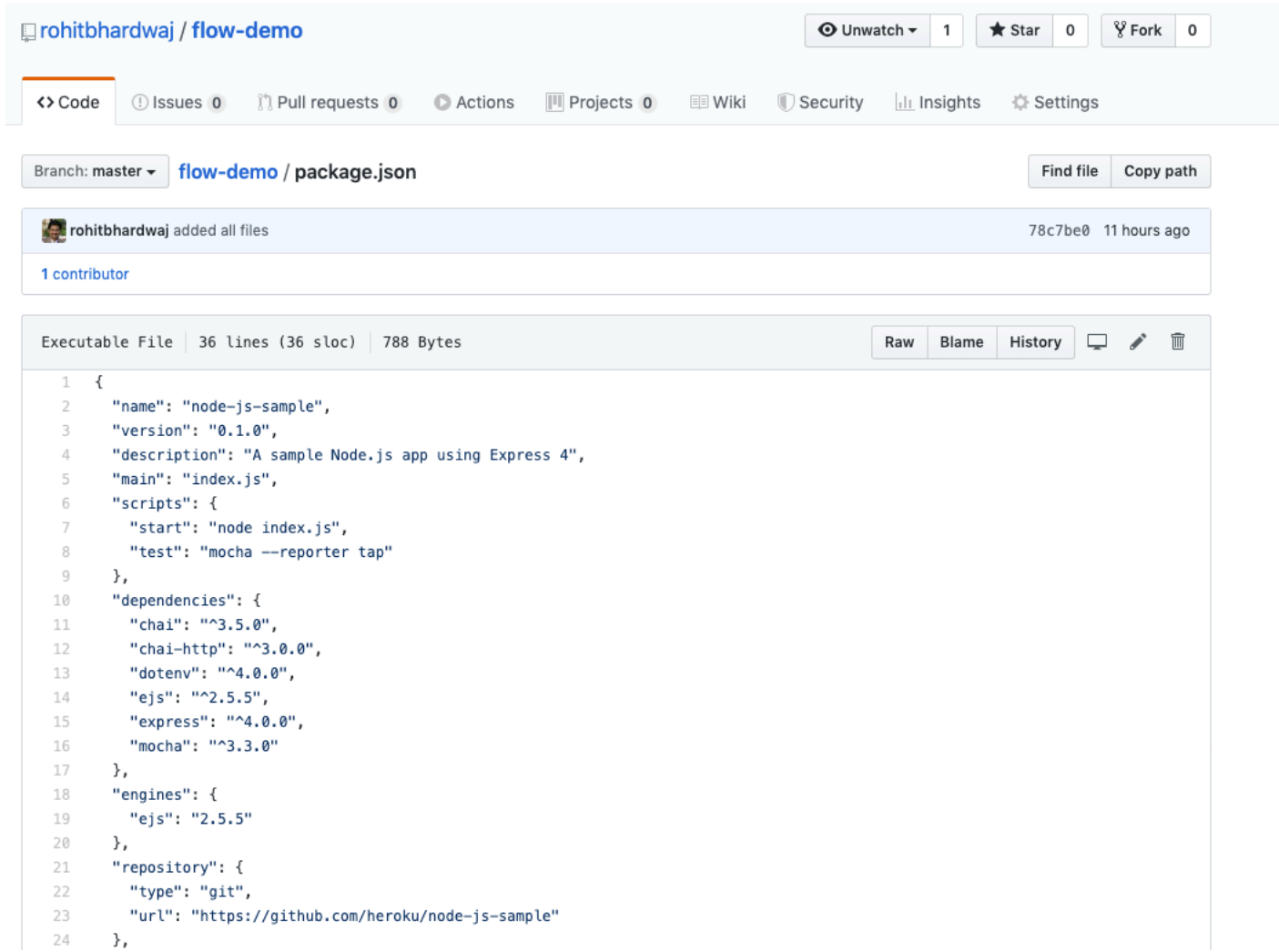
Use package manager when available

Node.js & JS – NPM

Java – Maven, Gradle, sbt

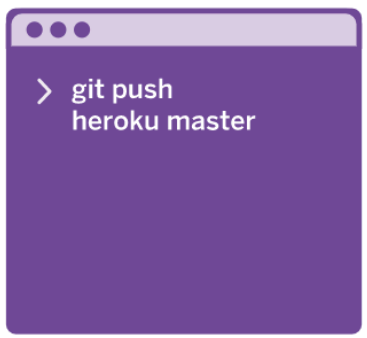
Ruby bundler

Python Pip and Virtualenv



1

Deploy code to Heroku



3. Configuration

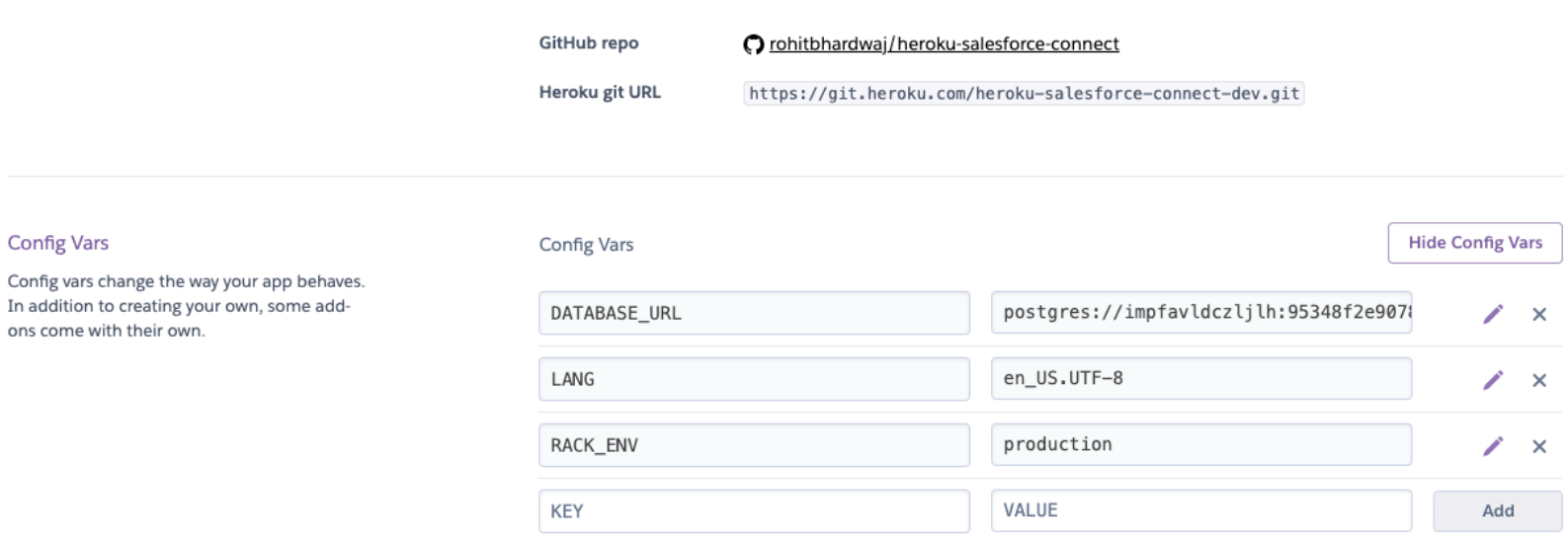
Anything which varies with environments

DB connections

Credentials

Environment variables

Automatic refresh of Certificate management



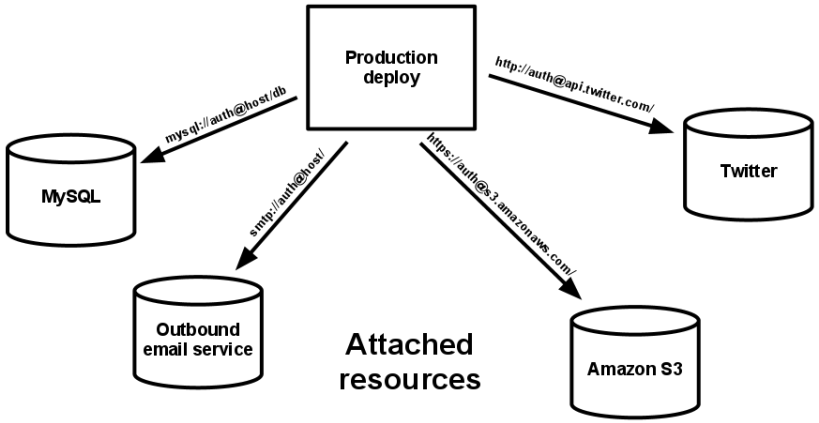
4. Backing Services

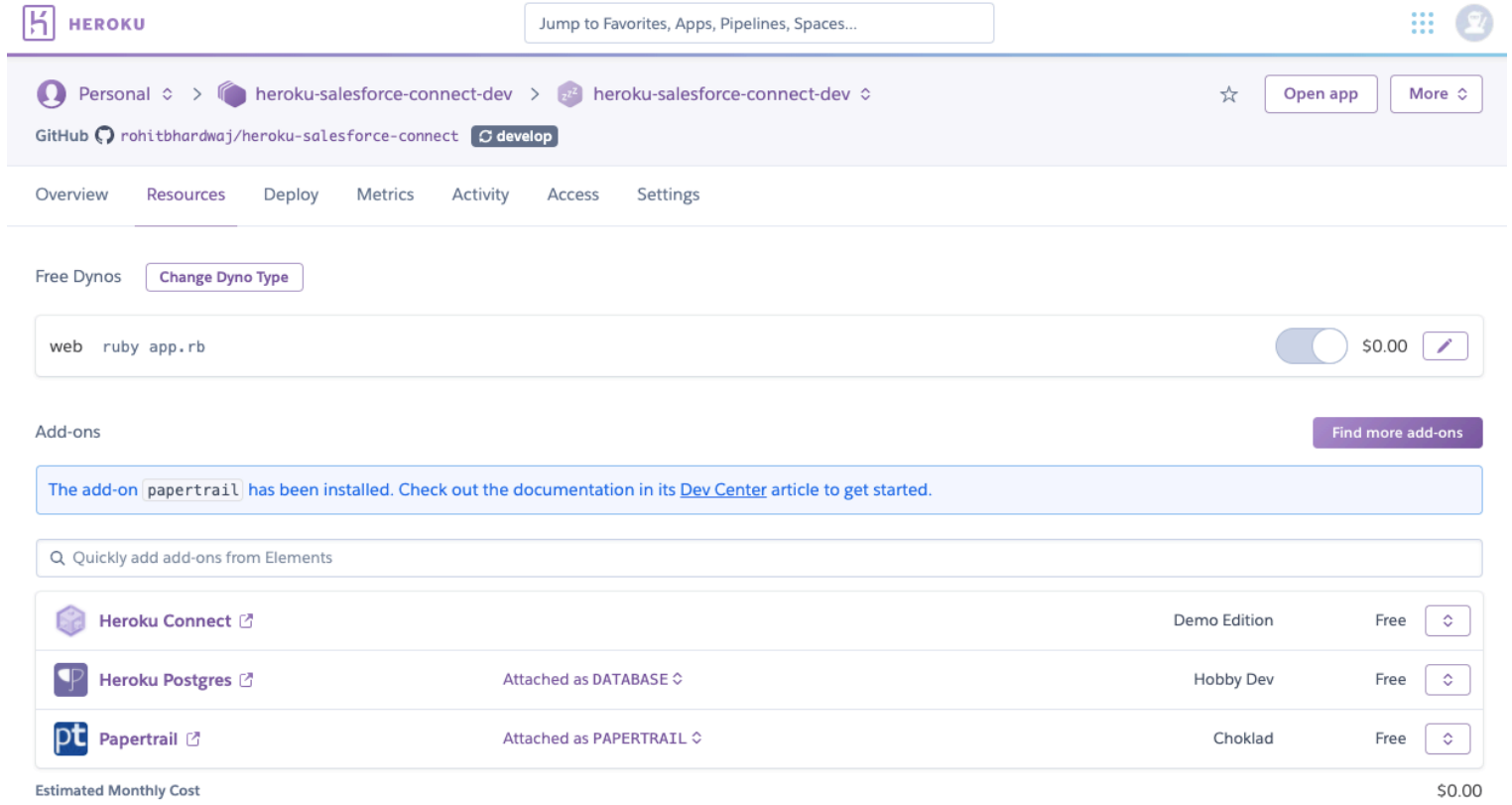
Define clean dependencies

Heroku – AWS S3

DB, Salesforce

Mobile – REST APIs, services

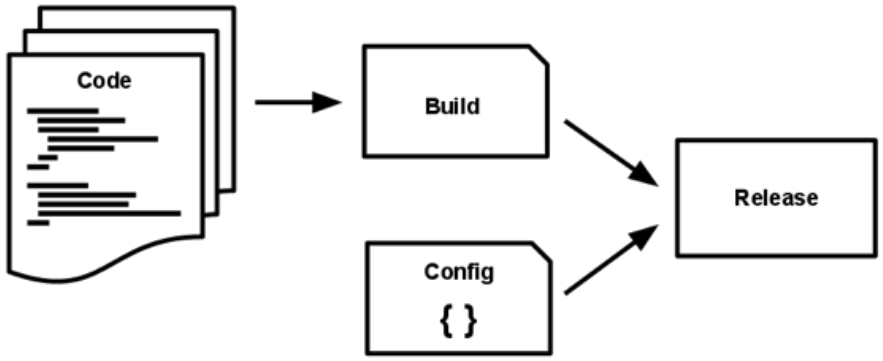




5. Build, Release and Run

Same Build code base is deployed to prod

Deploy the tested binary code



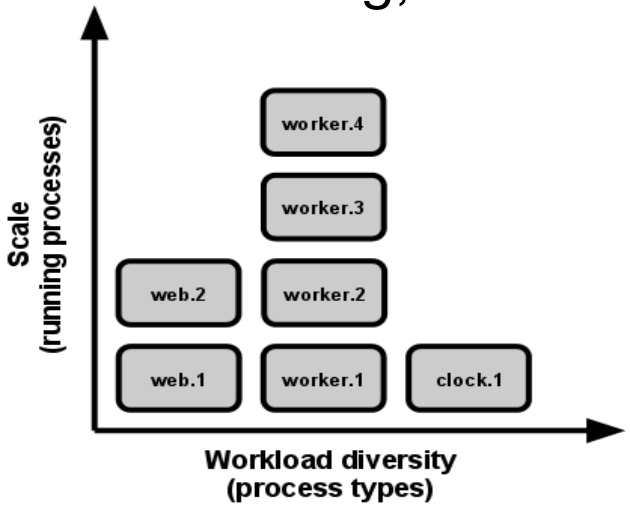
6. Process

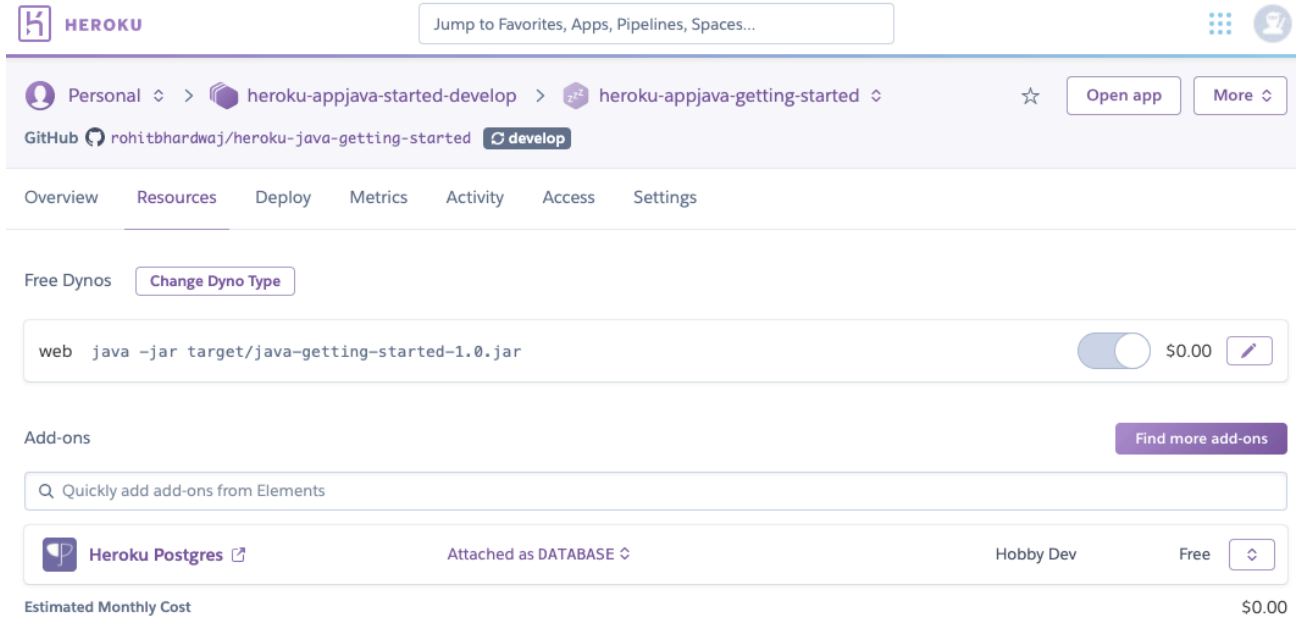
Code need to be stateless

Microservices

If State important- keep in external reliable store

Heroku Dynos – isolated, lightweight, share nothing, Linux containers

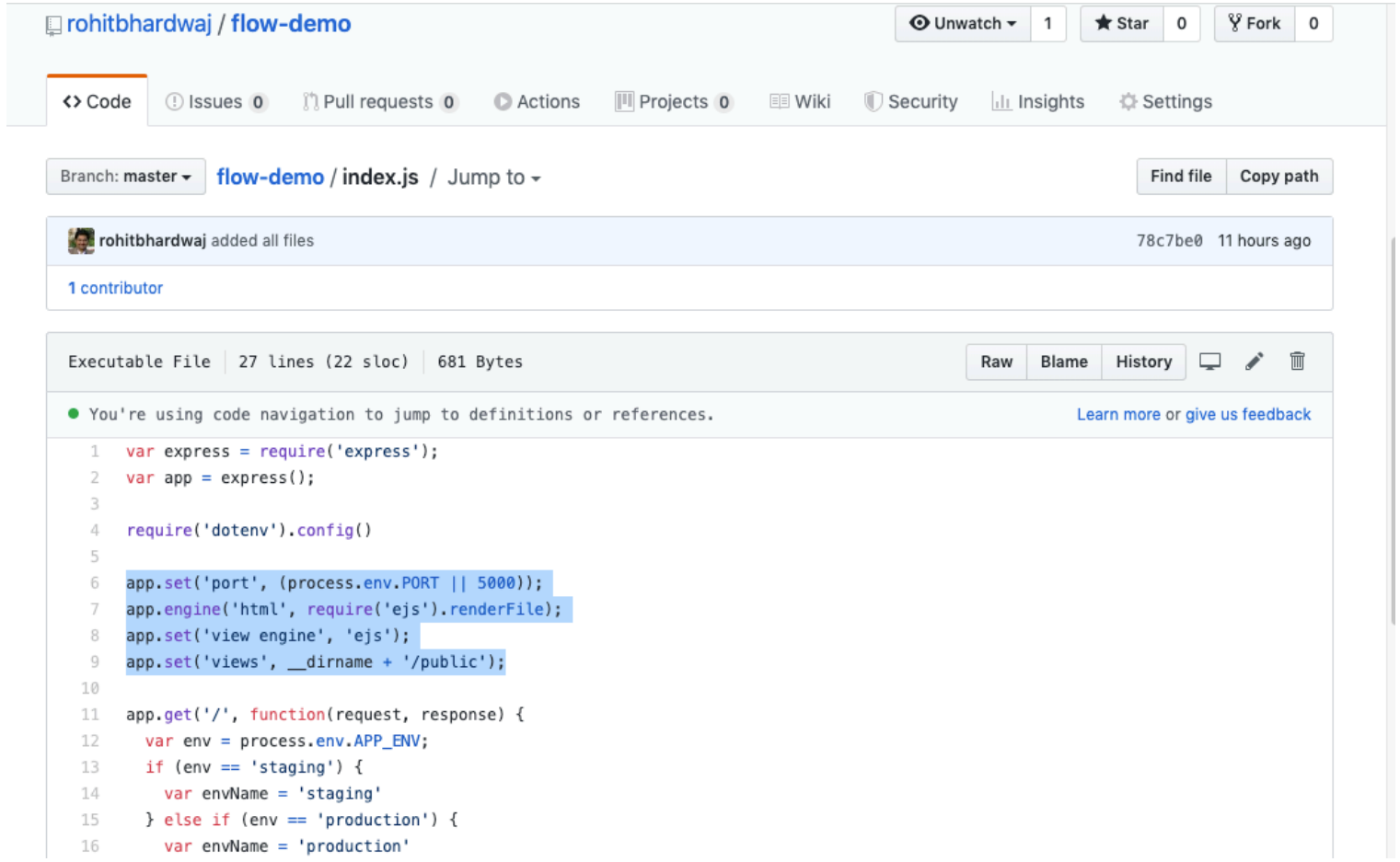




7. Port Binding

Webservices – HTTP port

Node.js Express framework



8. Concurrency

Run code as lots of small processes

Node.js multiple processes - ”clustering”

```
var WORKERS = process.env.WEB_CONCURRENCY || 1;
```

Second, we define a `start` function that will be the entry point for each newly clustered process:

```
function start() {
  // ...
}
```

Finally, we use throng to cluster the app into multiple processes. We specify a lifetime of `Infinity` to tell throng that, if a worker dies, it should be respawned - so we will always have `WORKERS` processes running:

```
throng({
  workers: WORKERS,
  lifetime: Infinity
}, start);
```

```
$ npm start

> example-concurrency@1.0.0 start example-concurrency
> node server.js

Listening on 3000
```

```
$ WEB_CONCURRENCY=4

$ npm start

> example-concurrency@1.0.0 start example-concurrency
> node server.js

Listening on 3000
Listening on 3000
Listening on 3000
Listening on 3000
```

https://devcenter.heroku.com/articles/node-concurrency#:~:text=js%20apps%20must%20fork%20multiple,many%20abstractions%20over%20the%20API.

9. Disposability

Launch quickly

< 30 seconds HTTP requests

Graceful degradation

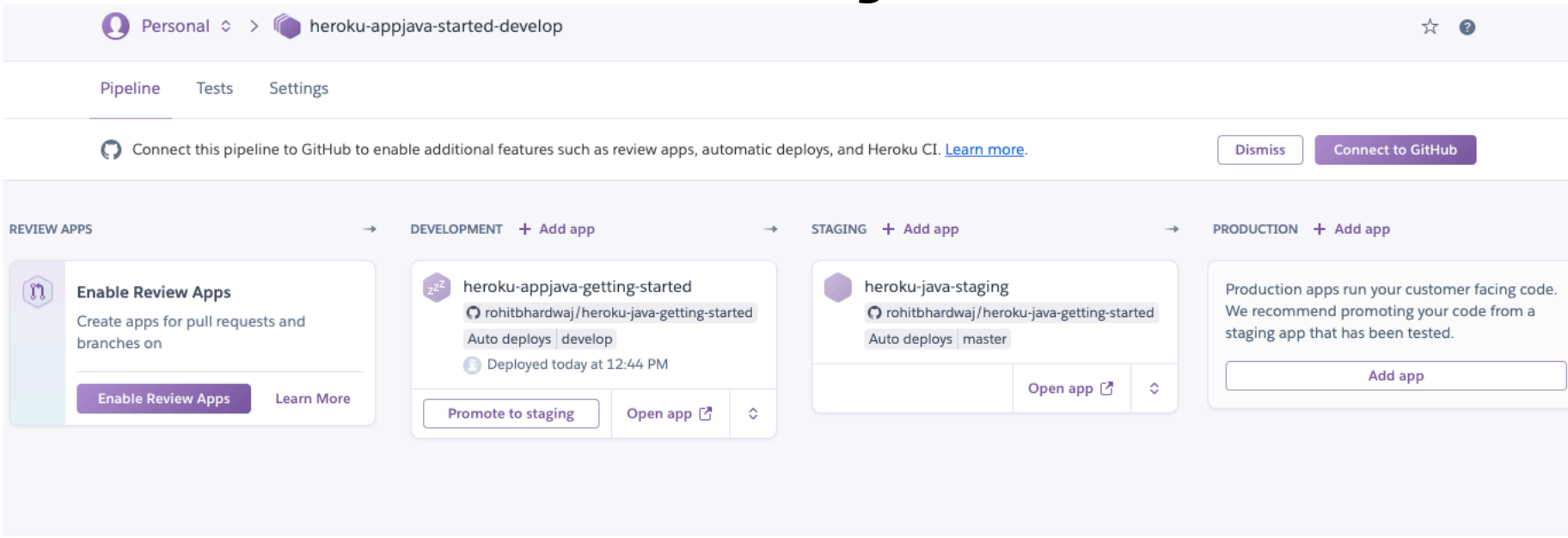
Shutdown / Interruptions

10. Development, Production Parity

Simple Heroku Pipeline

Automated deployment CI

Pipeline promotion



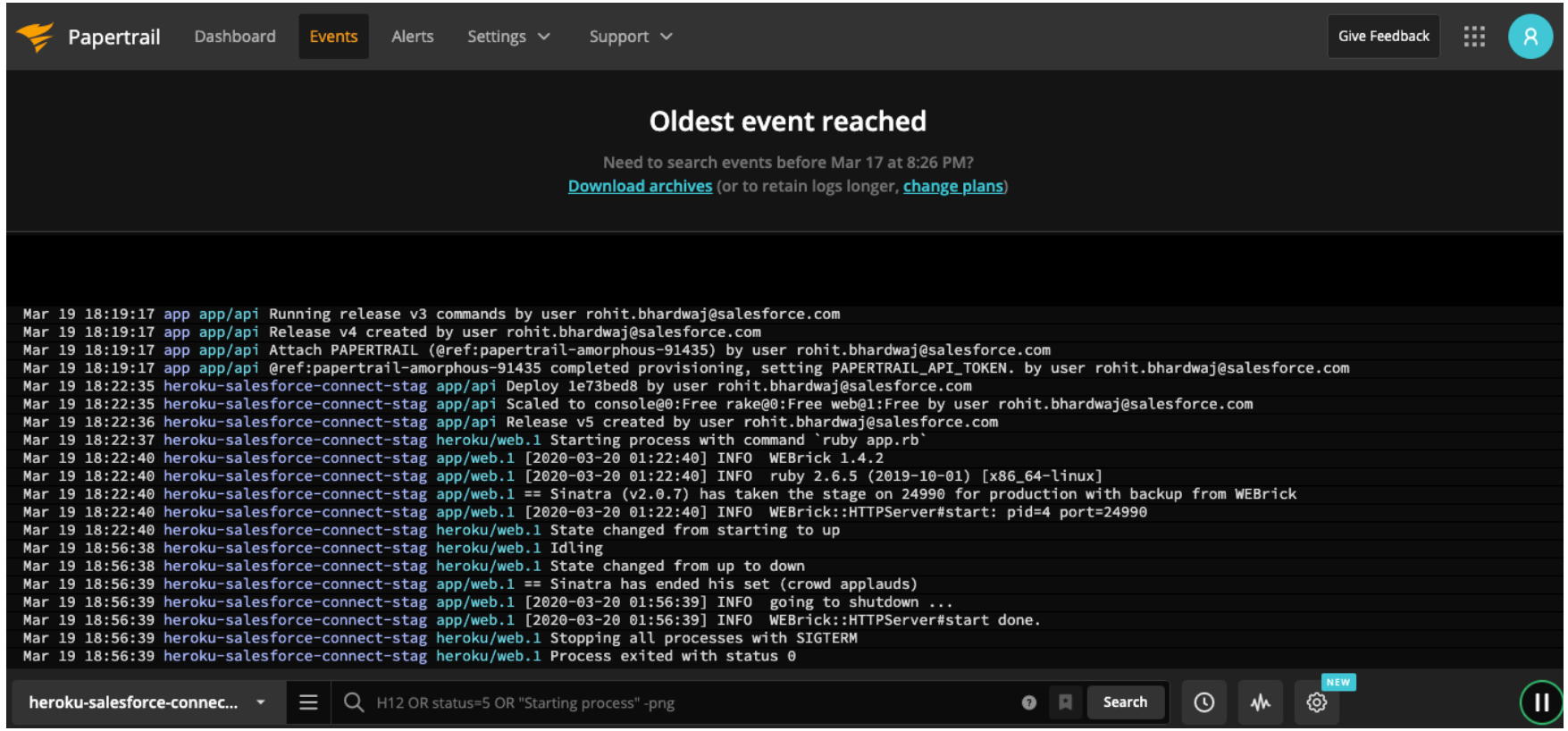
- **The time gap**
- **The personnel gap**: Developers write code, ops engineers deploy it.
- **The tools gap**: Developers may be using a stack like Nginx, SQLite, and OS X, while the production deploy uses Apache, MySQL, and Linux.

11. Logs

Monitor Logs

Listen to log events & errors

Filter events and actions



12. Admin Processes

Console is critical administrative and debugging tool

Heroku Toolbelt provides command line administration

Can be scripted & automated

HEROKU

Design Principles
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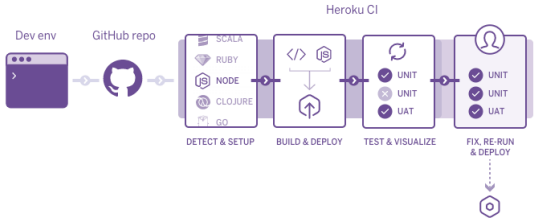

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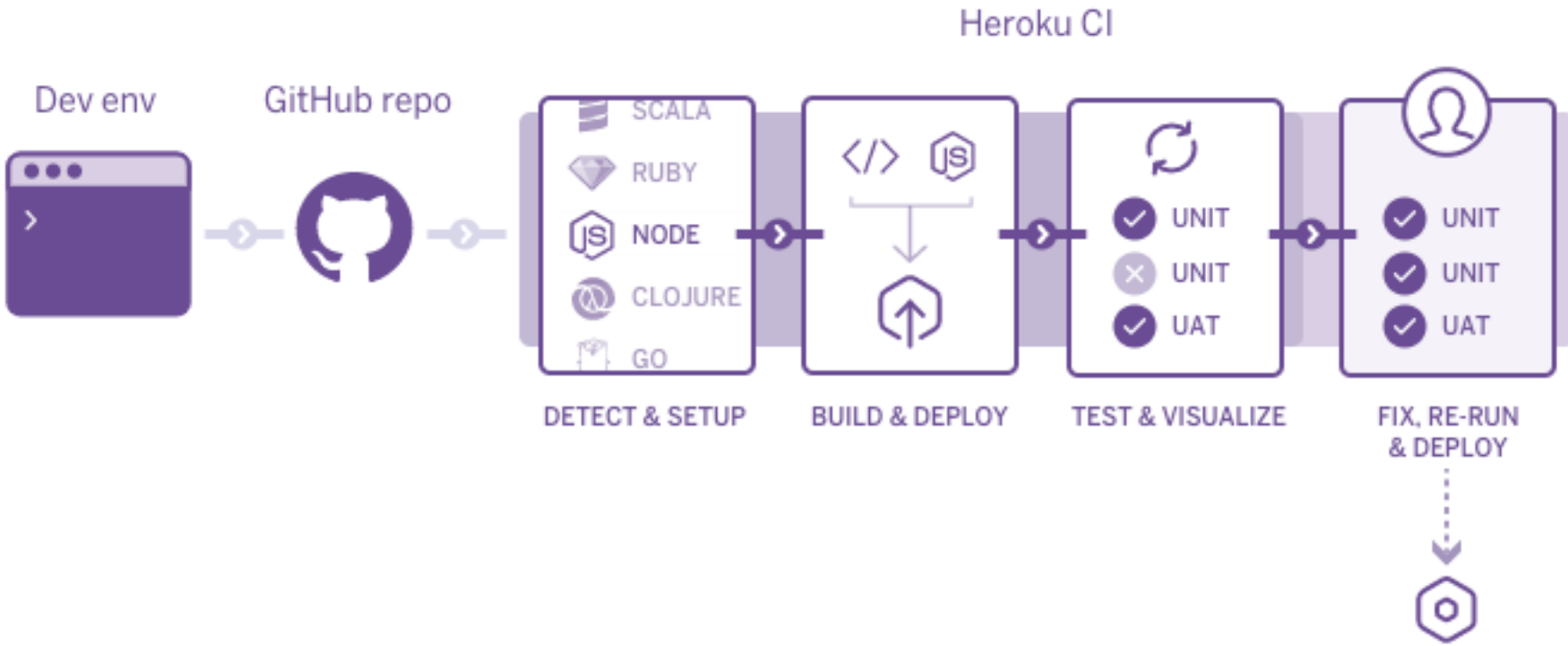
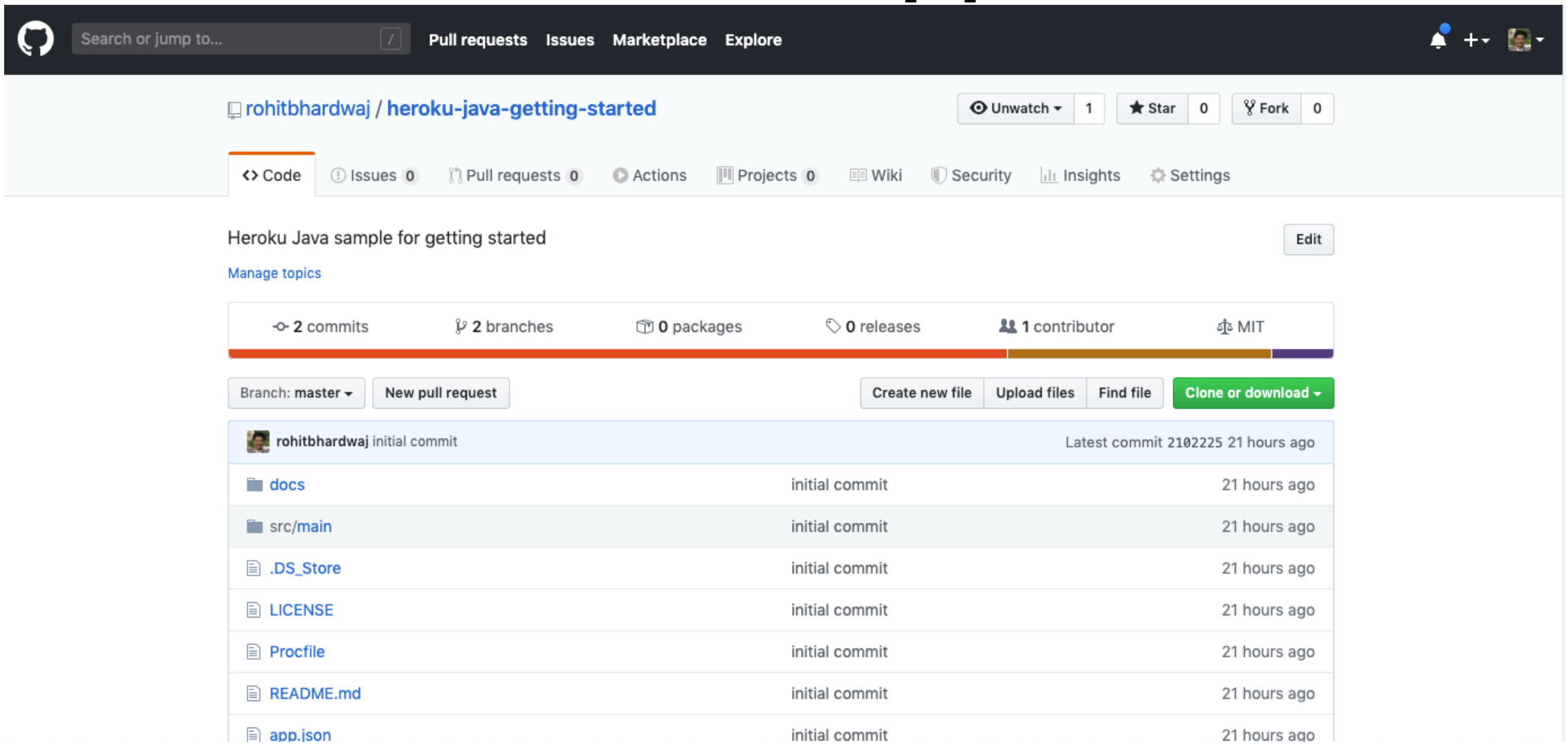
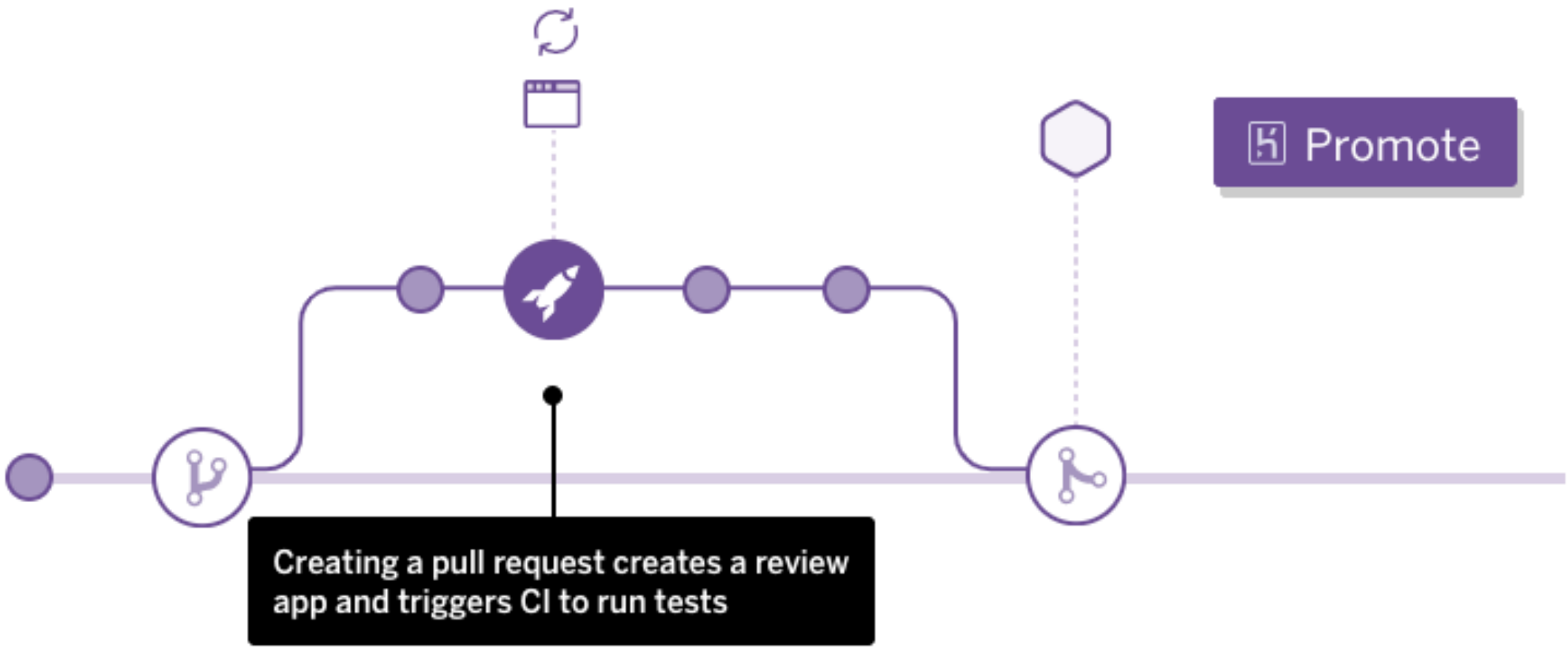

Heroku CI
Dev env
GitHub repo
SCALA
RUBY
NODE
CLOJURE
GO
UNIT
UNIT
UAT
UNIT
UNIT
UAT
DETECT & SETUP
BUILD & DEPLOY
TEST & VISUALIZE
FIX, RE-RUN
& DEPLOY

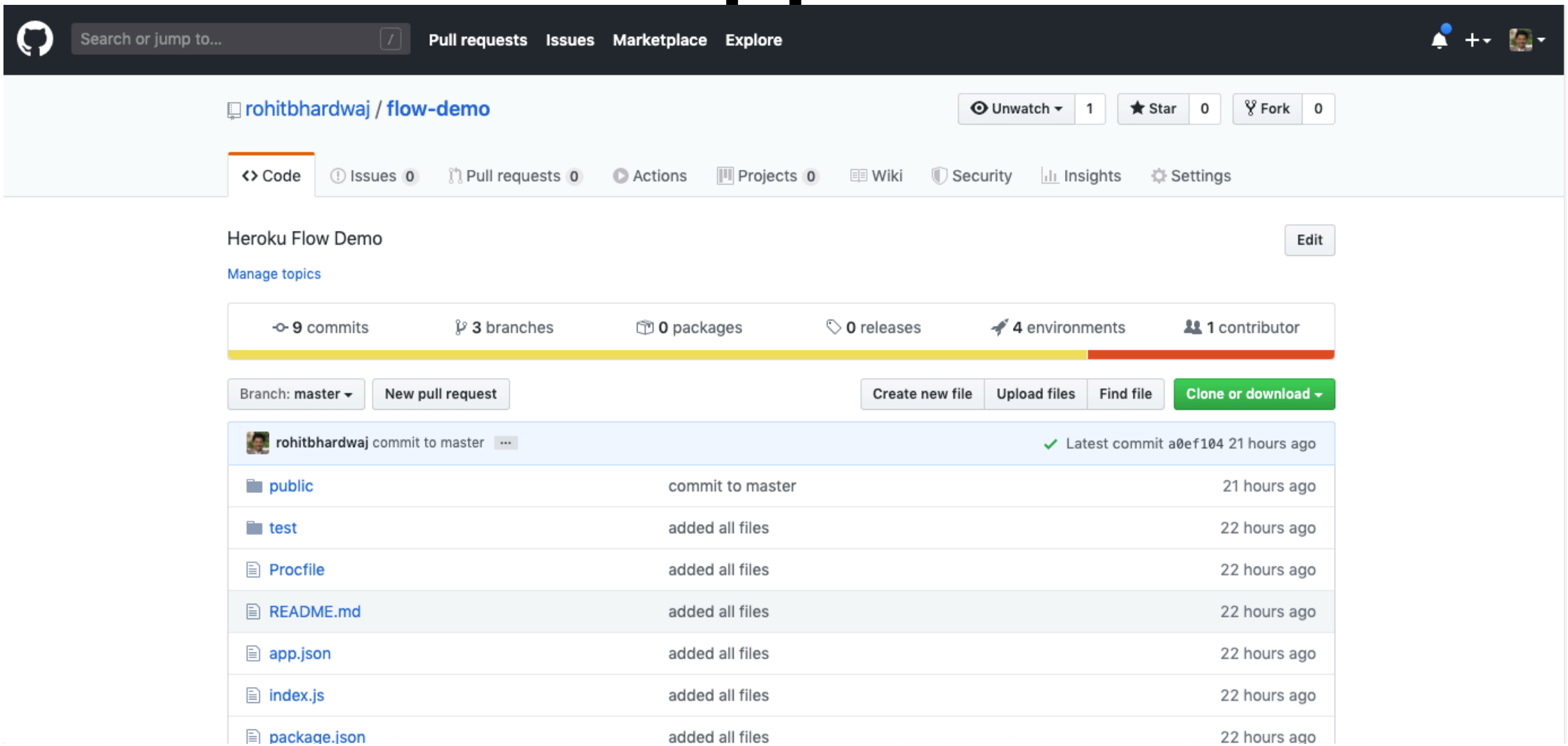
Demo – Java Application



Review Apps


Promote
Creating a pull request creates a review app and triggers CI to run tests

Review apps exercise



app.json

Branch: master ▾ flow-demo / app.json Find file Copy path

 rohitbhardwaj added all files 78c7be0 22 hours ago

1 contributor

Executable File | 18 lines (17 sloc) | 197 Bytes Raw Blame History

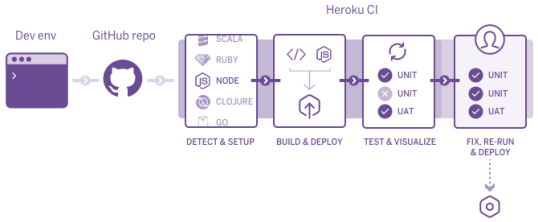
```
{
  "name": "sample-node-app",
  "scripts": {
  },
  "formation": {
    "web": {
      "quantity": 1
    }
  },
  "addons": [

  ],
  "buildpacks": [
    {
      "url": "heroku/nodejs"
    }
  ]
}
```

https://devcenter.heroku.com/articles/app-json-schema

HEROKU

Design Principles
12 Factor Apps



Heroku CI

Heroku Use cases

Heroku Private Spaces

Heroku Connect

Configuration

Heroku Use cases

Heroku Use Cases with Salesforce

Perform Complex Processing

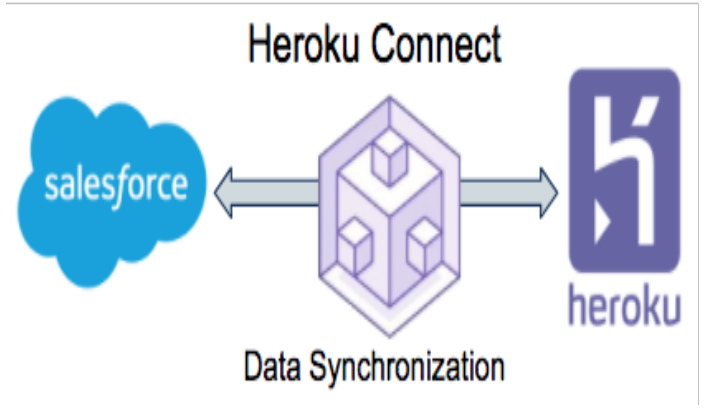
- Run code that is complex or involves lot
- Scheduled or Batch processing
- IOT data

Heroku Use Cases with Salesforce

Manage Large Volumes of Data

- Data not operationally significant in Salesforce but still part of
- Aggregate/Transform data from multiple Salesforce Orgs, Active Archive

Heroku Use Cases with Salesforce



Integrate

- Host Web Services, External Systems, Back Office
- Heroku Connect to Salesforce, and Canvas

Heroku Use Cases with Salesforce

Leverage Elastic Scale

- Blockchain, Image Processing
- PDF Generation, Transaction Volumes

Heroku Use Cases with Salesforce

Manage Large Volumes of Data

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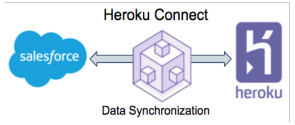


Leverage Elastic Scale

- Blockchain, Image Processing
- PDF Generation, Transaction Volumes

Heroku Non Use Cases with Salesforce

Application do not follow 12 factor App principles

Application use local file system for processing

Application uses non standard ports

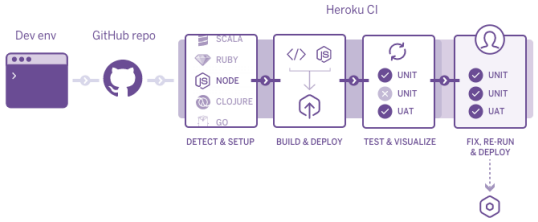
Application uses proprietary software

Heroku Use Cases with Salesforce

	Pros	Cons
Lift-and-Shift	• Minimal work required to move application • Faster migration and deployment	• Typically does not take advantage of native features of the cloud platform • May cost more to operate in a cloud
Partial Refactor	• Only parts of the application are modified • Faster migration and deployment than complete refactoring	• Only takes advantage of some features of the cloud • May cost more to operate in a cloud
Complete Refactor	• Applications typically offer higher performance • Applications can be optimized to operate at lower costs	• Much higher cost since much of the application must change • Slower time to deployment

HEROKU

Design Principles
12 Factor Apps



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Heroku Private Spaces

A Private Space, part of Heroku Enterprise, is a network isolated group of apps and data services with a dedicated runtime environment, provisioned to Heroku in a geographic region you specify.

Shield

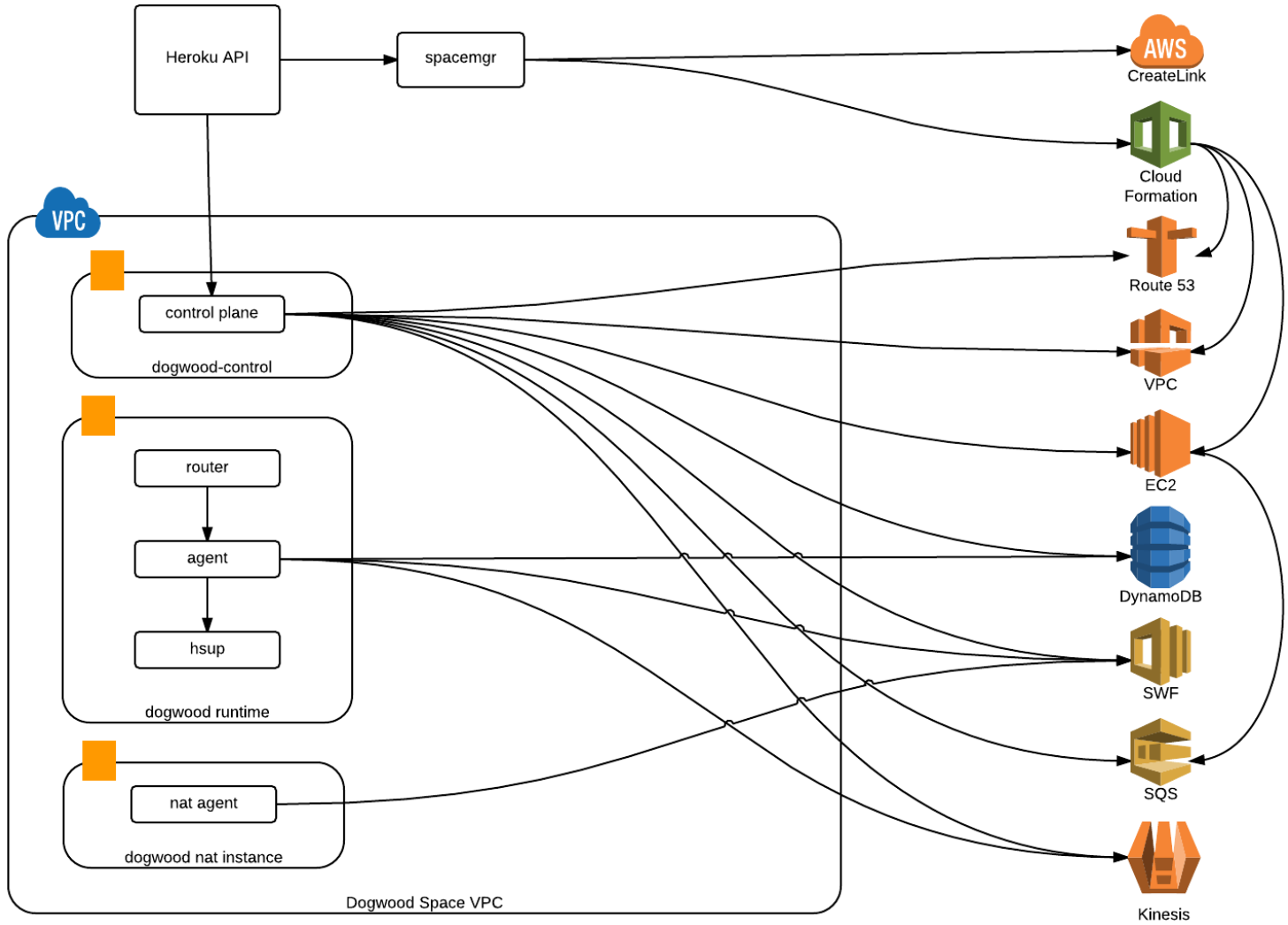
Private Spaces

- HIPAA
- PCI

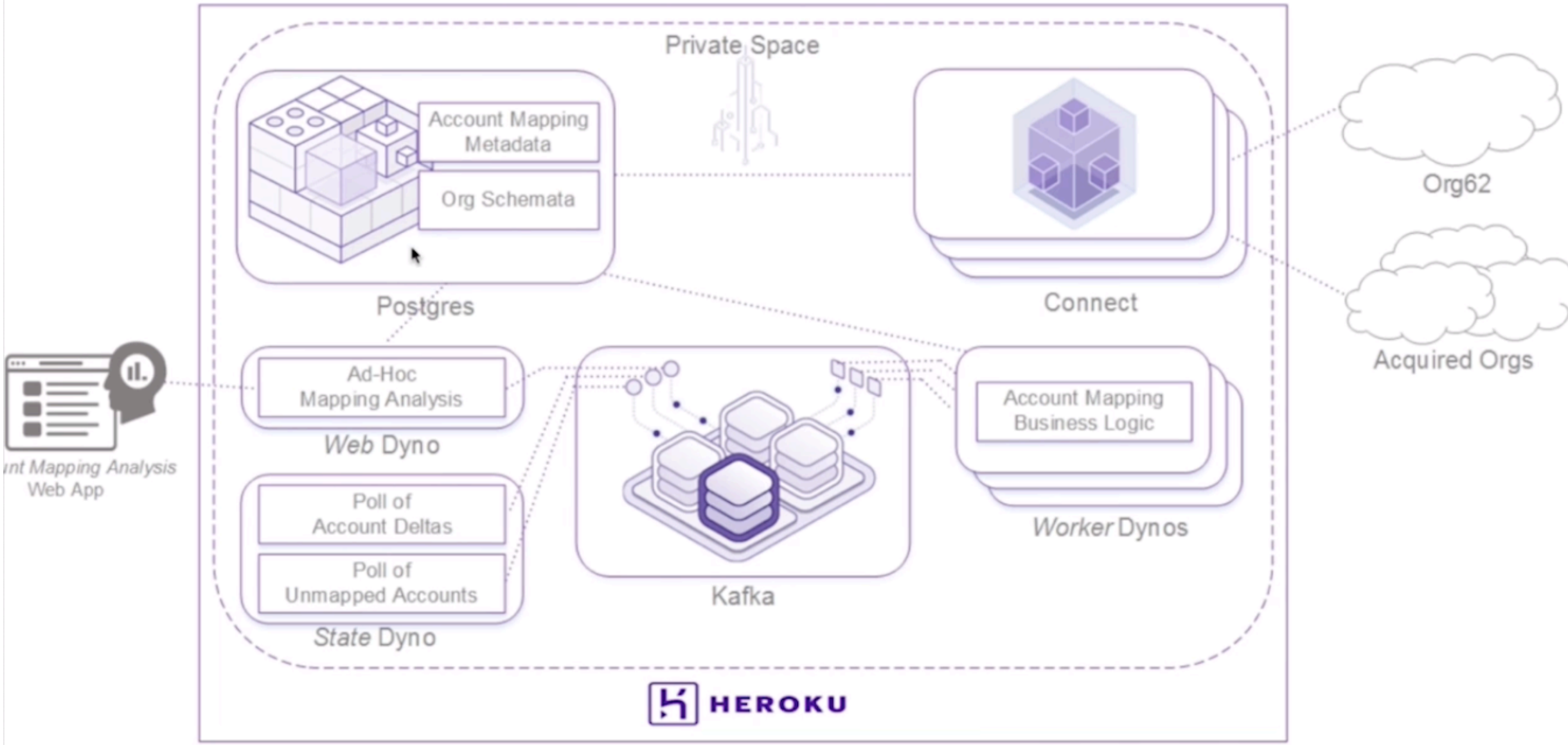
Like a Cone-of-Silence, but Privater

Heroku Private Spaces

- Dedicated private network
- Private data service
- Trusted IP ranges
- Selectable regions
- VPC peering



8 minutes – no fuss, no muss


Private Space
Account Mapping Metadata
Org Schemata
Postgres
Connect
Org62
Acquired Orgs
Ad-Hoc Mapping Analysis
Web Dyno
Poll of Account Deltas
Poll of Unmapped Accounts
State Dyno
Kafka
Account Mapping Business Logic
Worker Dynos
nt Mapping Analysis
Web App
HEROKU

HEROKU

Jump to Favorites, Apps, Pipelines, Spaces...

sfdc-aloha > sandbox-playnice

Apps Access Network Settings

Trusted IP Ranges

Which external IPs are allowed to connect to web dynos in this Space (use CIDR notation to specify inbound IP whitelists). Learn More.

0.0.0.0/0

e.g. 172.16.180.7/23

Add

Space Outbound IPs

All traffic originating from apps within this Space comes from these IP addresses via network address translation (NAT). Learn more.

```
34.193.70.215
34.192.222.1
34.193.40.206
34.193.94.166
```

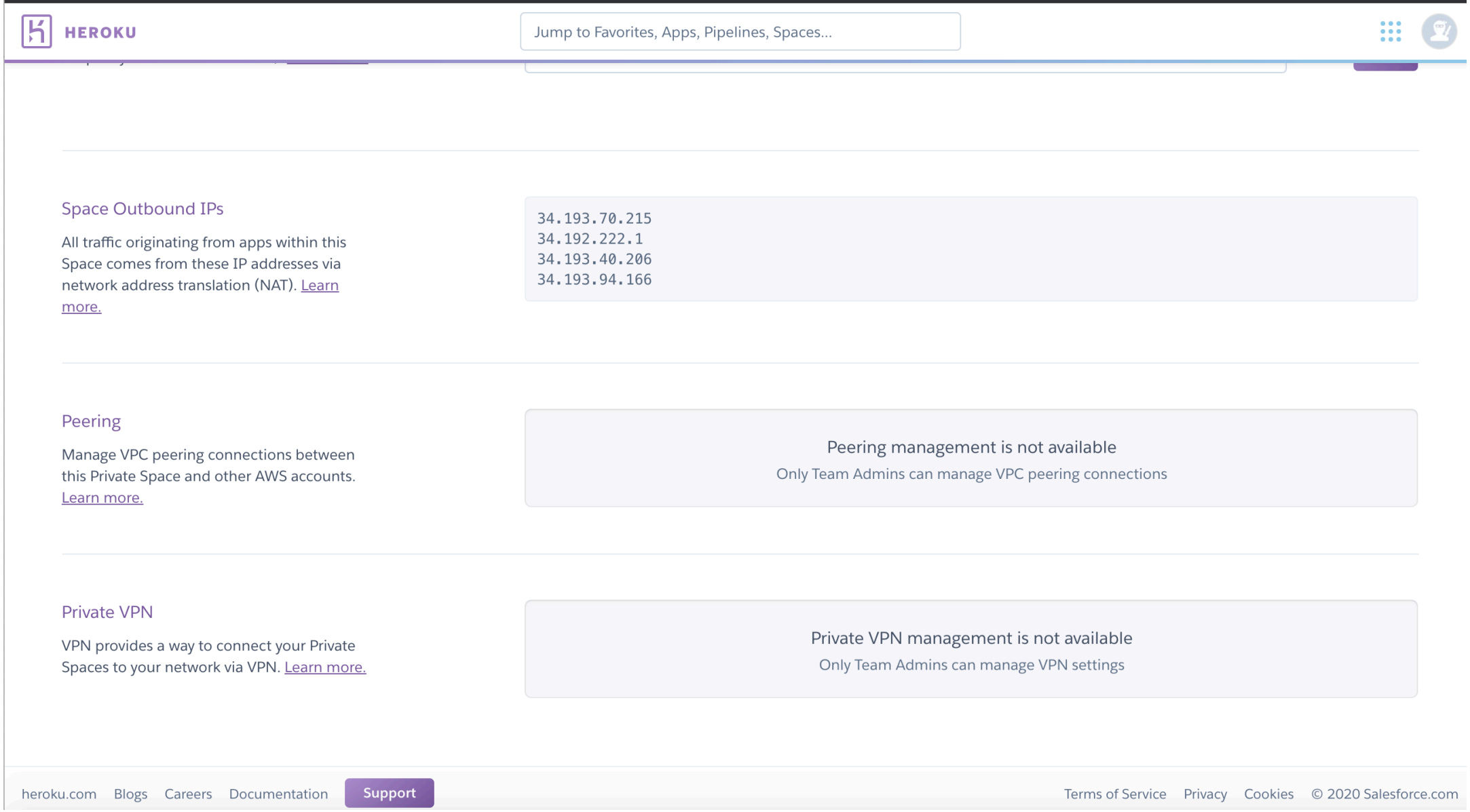
Peering

Manage VPC peering connections between this Private Space and other AWS accounts. Learn more.

Peering management is not available

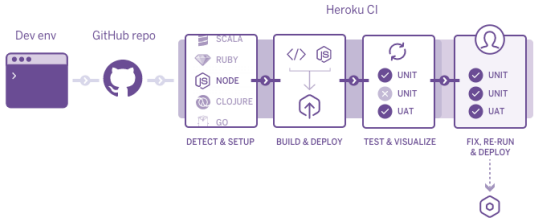
Only Team Admins can manage VPC peering connections

Lift and shift: Fork lifting



HEROKU

Design Principles
12 Factor Apps



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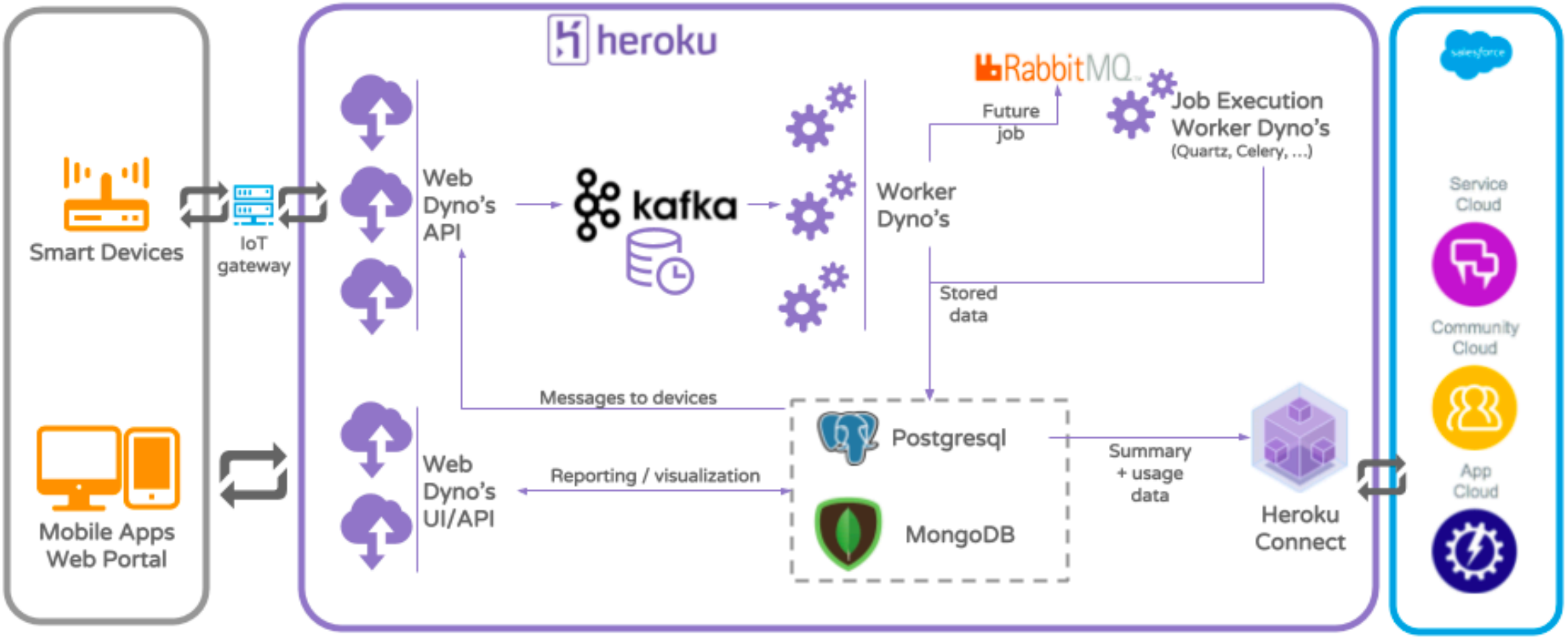
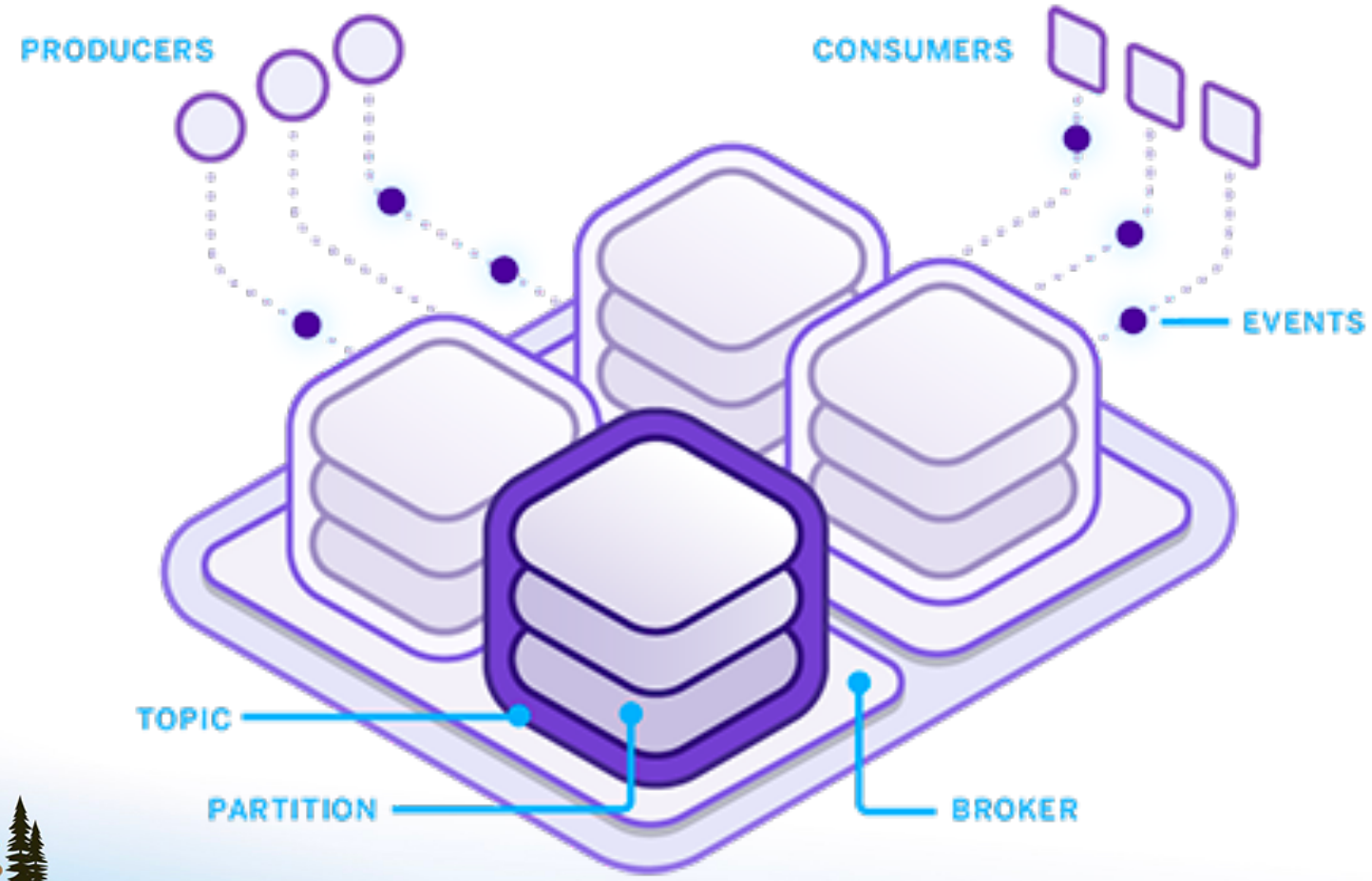
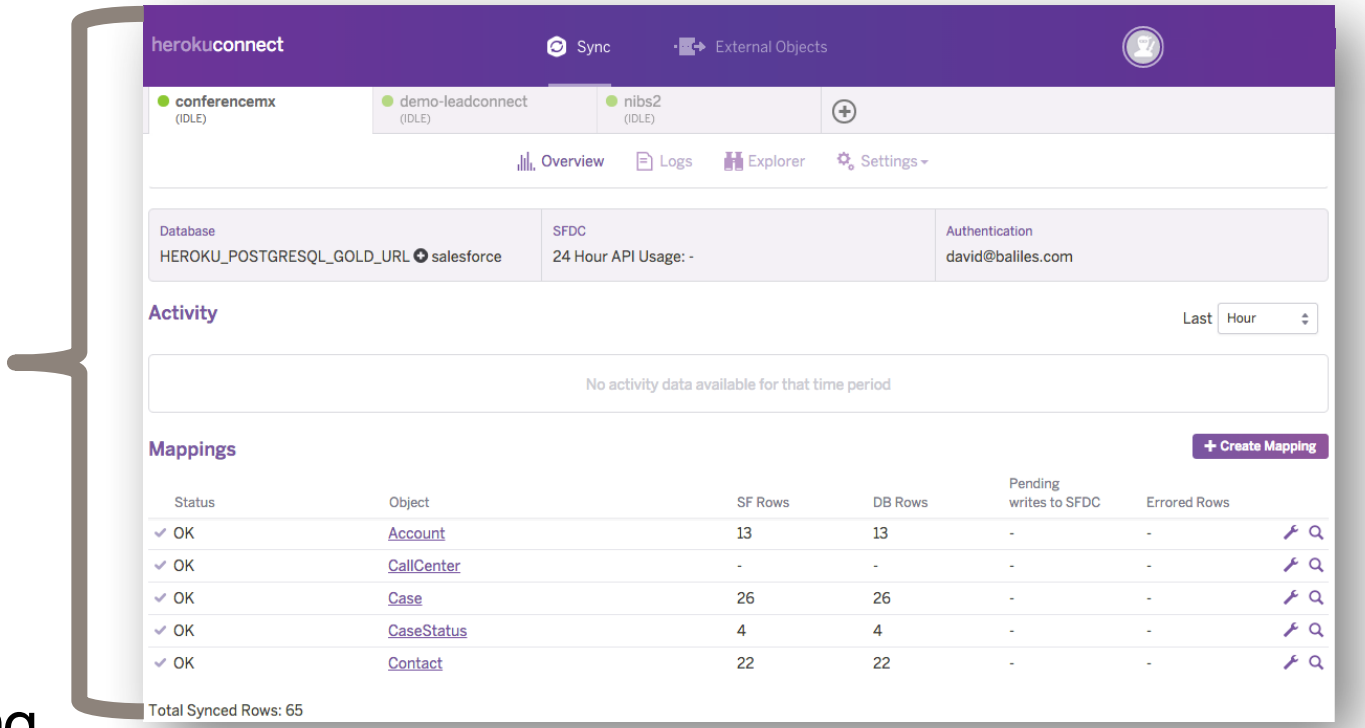
Heroku Sample Architecture



Kafka demo



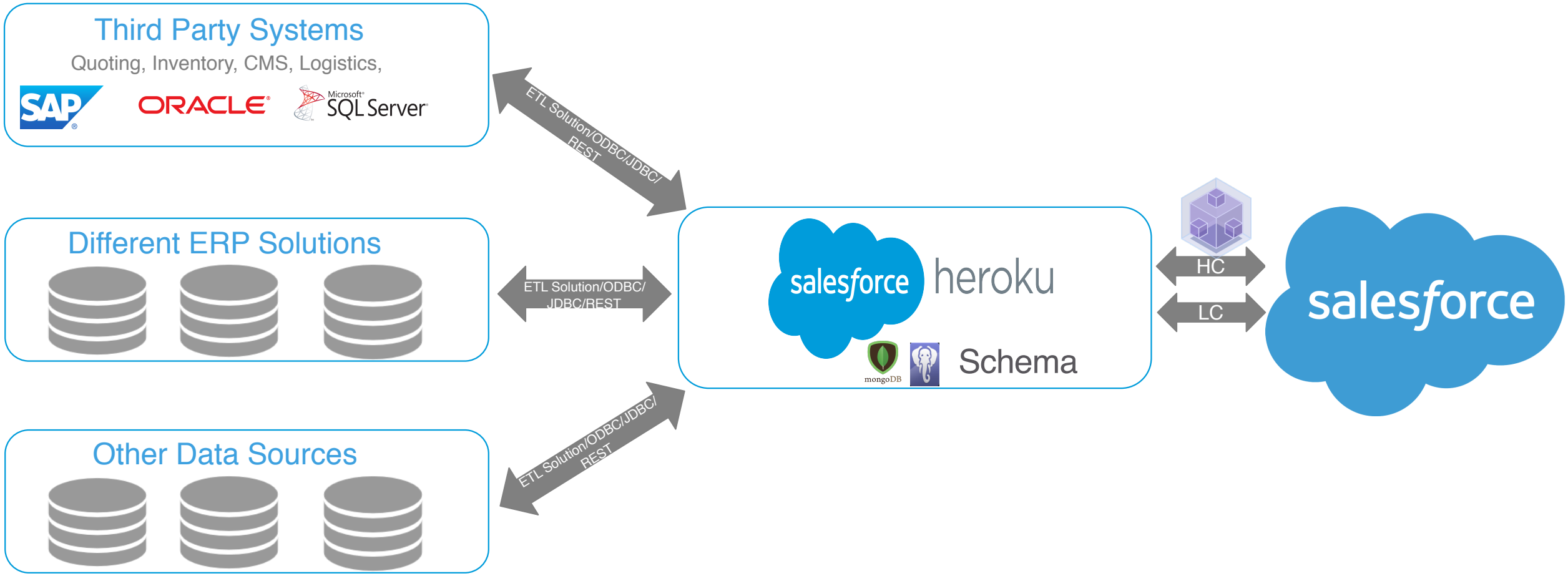
Heroku Connect to Lightning



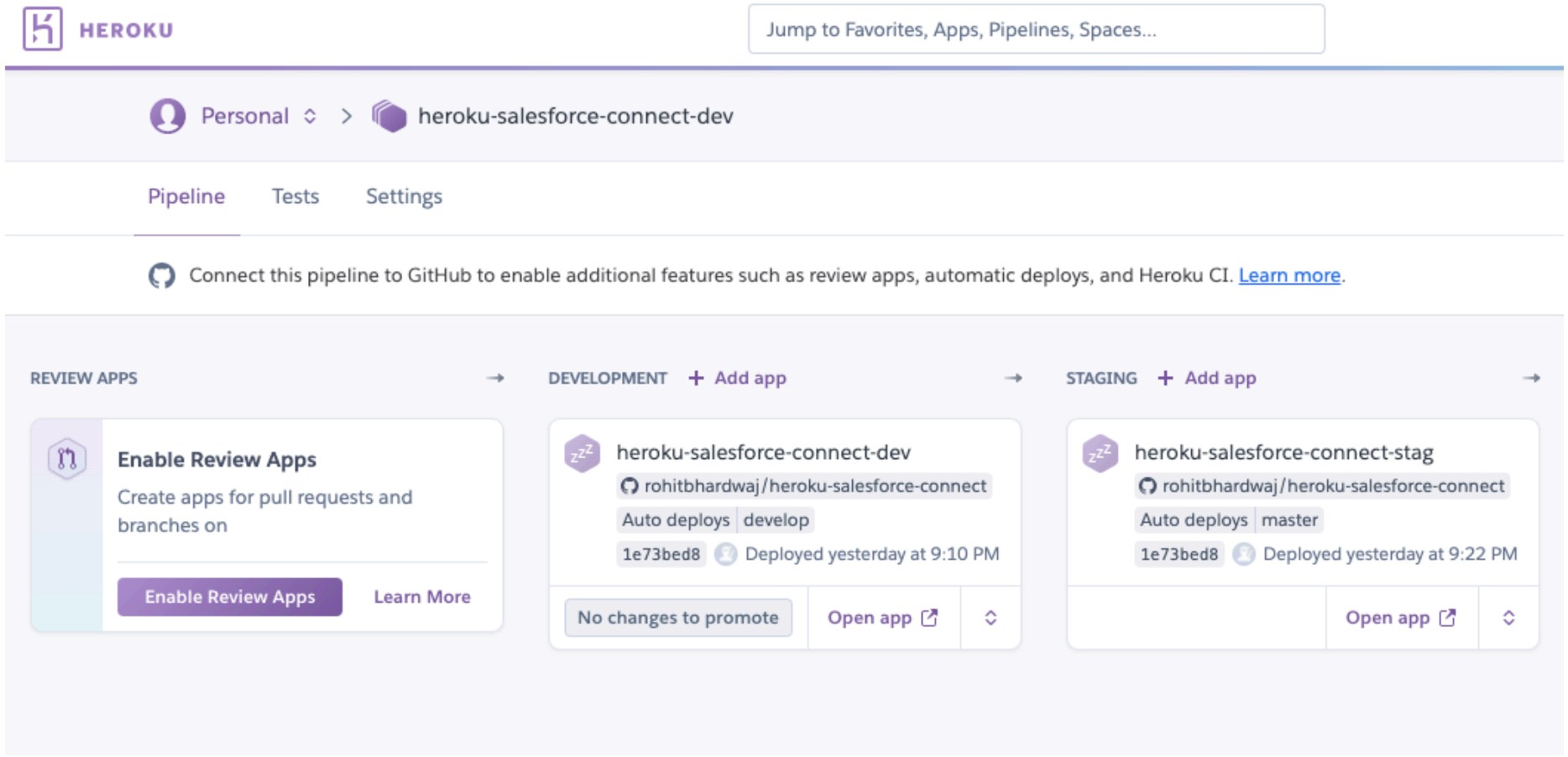
- Bi-directional data sync
- Point and click configuration
- Create External Objects using OData
- Does not consume API Transactions

No-code integration to unleash your CRM, Service, and Custom Data

Heroku – Database as a Service - Data Aggregation/Data Warehousing



Salesforce Connect



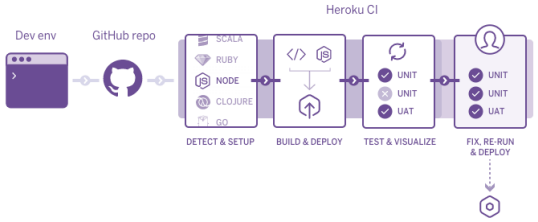
Heroku is a Platform

Heroku is a Platform which enables developers to go from zero to H E R O.

Fast!

HEROKU

Design Principles
12 Factor Apps



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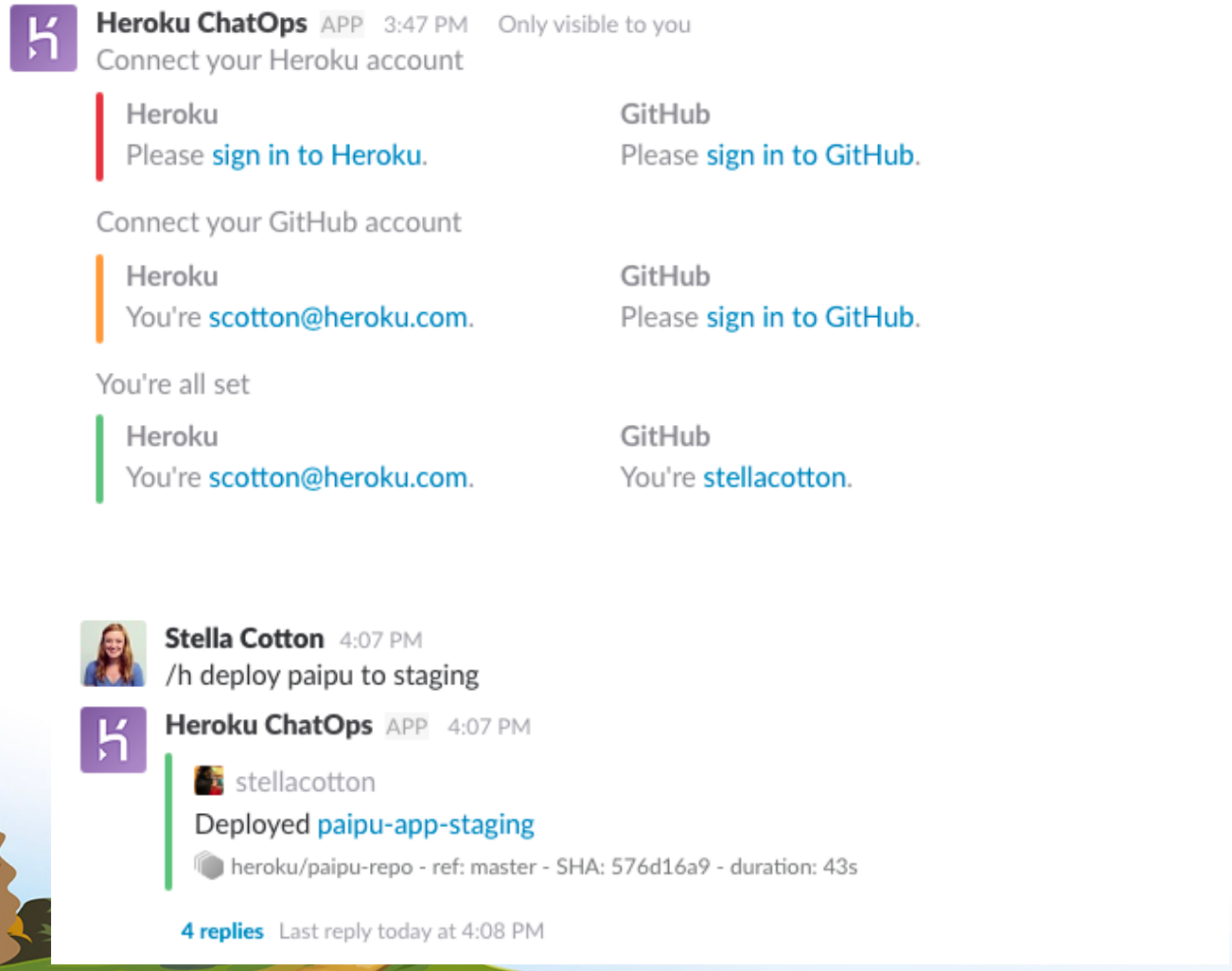
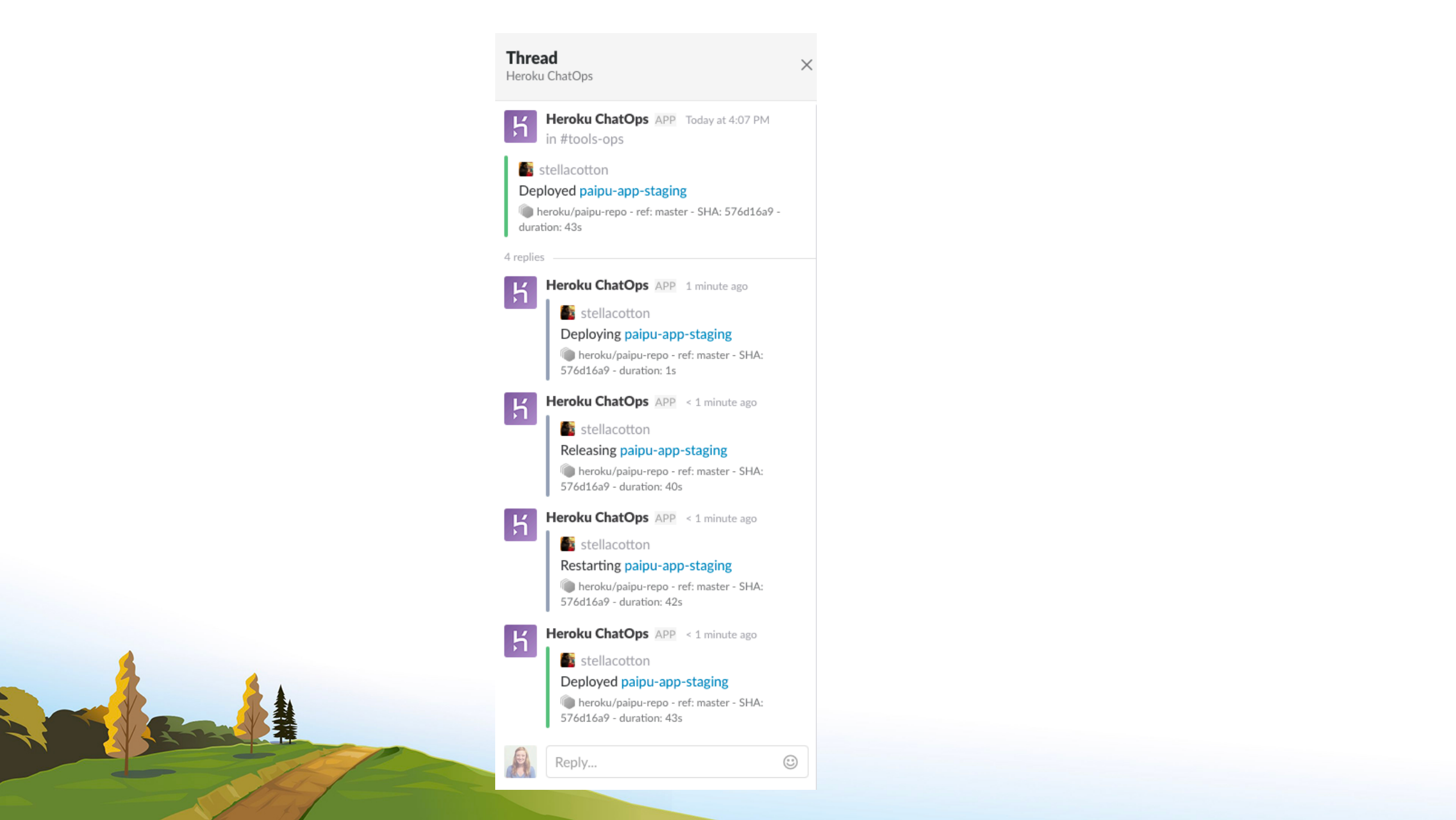
ChatOps


Heroku ChatOps APP 3:47 PM Only visible to you
Connect your Heroku account
Heroku
Please sign in to Heroku.
GitHub
Please sign in to GitHub.
Connect your GitHub account
Heroku
You're scotton@heroku.com.
GitHub
Please sign in to GitHub.
You're all set
Heroku
You're scotton@heroku.com.
GitHub
You're stellacotton.
Stella Cotton 4:07 PM
/h deploy paipu to staging
Heroku ChatOps APP 4:07 PM
stellacotton
Deployed paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 43s
4 replies Last reply today at 4:08 PM


Thread
Heroku ChatOps
Heroku ChatOps APP Today at 4:07 PM
in #tools-ops
stellacotton
Deployed paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 43s
4 replies
Heroku ChatOps APP 1 minute ago
stellacotton
Deploying paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 1s
Heroku ChatOps APP < 1 minute ago
stellacotton
Releasing paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 40s
Heroku ChatOps APP < 1 minute ago
stellacotton
Restarting paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 42s
Heroku ChatOps APP < 1 minute ago
stellacotton
Deployed paipu-app-staging
heroku/paipu-repo - ref: master - SHA: 576d16a9 - duration: 43s
Reply...

Troubleshooting & Support

- Heroku Status
- Error Pages
- Request Timeout
- R14 - Memory Quota Exceeded in Ruby (MRI)
- Wrong Version of Ruby or Rake in App
- Support Channels
- Heroku Error Codes
- Understanding Heroku Postgres Log Statements and Common Errors
- Recovering an Offline Application
- Troubleshooting Memory Issues in Java Applications
- Paid Support

Security

Additional security features, such as network isolation with Private Spaces, are available as part of Heroku Enterprise.

App Security

- Understanding SSL on Heroku
- Automated Certificate Management
- Heroku SSL
- Manually Acquiring an SSL/TLS Certificate
- WebSocket Security
- Penetration Testing and Network Scanning
- Cookies and the Public Suffix List
- SSL Endpoint
- Creating a Self-Signed SSL Certificate

Identities & Authentication

- Two-factor Authentication

Compliance

- Heroku Security, Privacy, and Compliance
- PCI Compliance
- Heroku and GDPR

Troubleshooting

Environment Variable	Description
`HEROKU_DEBUG=1`	Shows debugging information mostly related to Heroku API interactions
`HEROKU_DEBUG_HEADERS=1`	Alongside `HEROKU_DEBUG=1`, shows HTTP headers
`DEBUG=*`	Shows very verbose debugging information

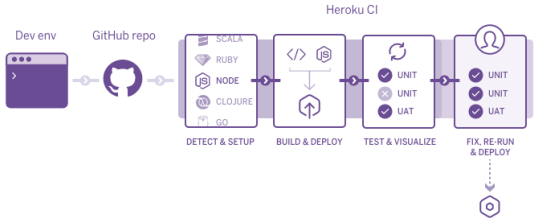
https://devcenter.heroku.com/articles/heroku-cli#troubleshooting

Troubleshooting

OS	Location
macOS	`~/Library/Caches/heroku/error.log`
Windows	`%LOCALAPPDATA%\heroku\error.log`
Linux/Other	`~/.cache/heroku/error.log` (or `XDG_CACHE_HOME` if set)

HEROKU

Design Principles
12 Factor Apps



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Salesforce Platform

salesforce lightning

salesforce heroku

Sales Service Marketing Community Analytics

SaaS

Apps

aPaaS

APPEXCHANGE

ELEMENTS

DECLARATIVE DEVELOPMENT

Schema Builder | App Builder | Process Builder | Page Builder

Community Builder | Sharing & Permissions | Collaboration | Global Search

Workflow Engine | Encryption | Reports & Dashboards | Auto Updates

DEVELOPER EXPERIENCE

COMPLETE CRM + CUSTOM SCHEMA

Salesforce1 Mobile | Identity | Files & Content

HEROKU CONNECT

DATA SERVICES

PostgreSQL redis

SOAP | REST | Bulk | OData 4.0 | Tooling | APIs & TOOLs | Metadata | CLI Sandbox | IDE | Dev Console

Unmatched Application-level Security

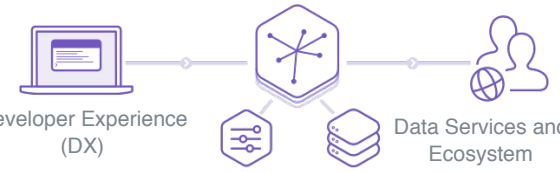
Unmatched Infrastructure-level Security

TRUST

Trusted Networks | Authentication Options | Object Level Security | Field Level Security | Audit Trail Object History Tracking

Firewall | SSL Accelerators | Load Balancers | Web/App Servers | Database Servers

Runtime

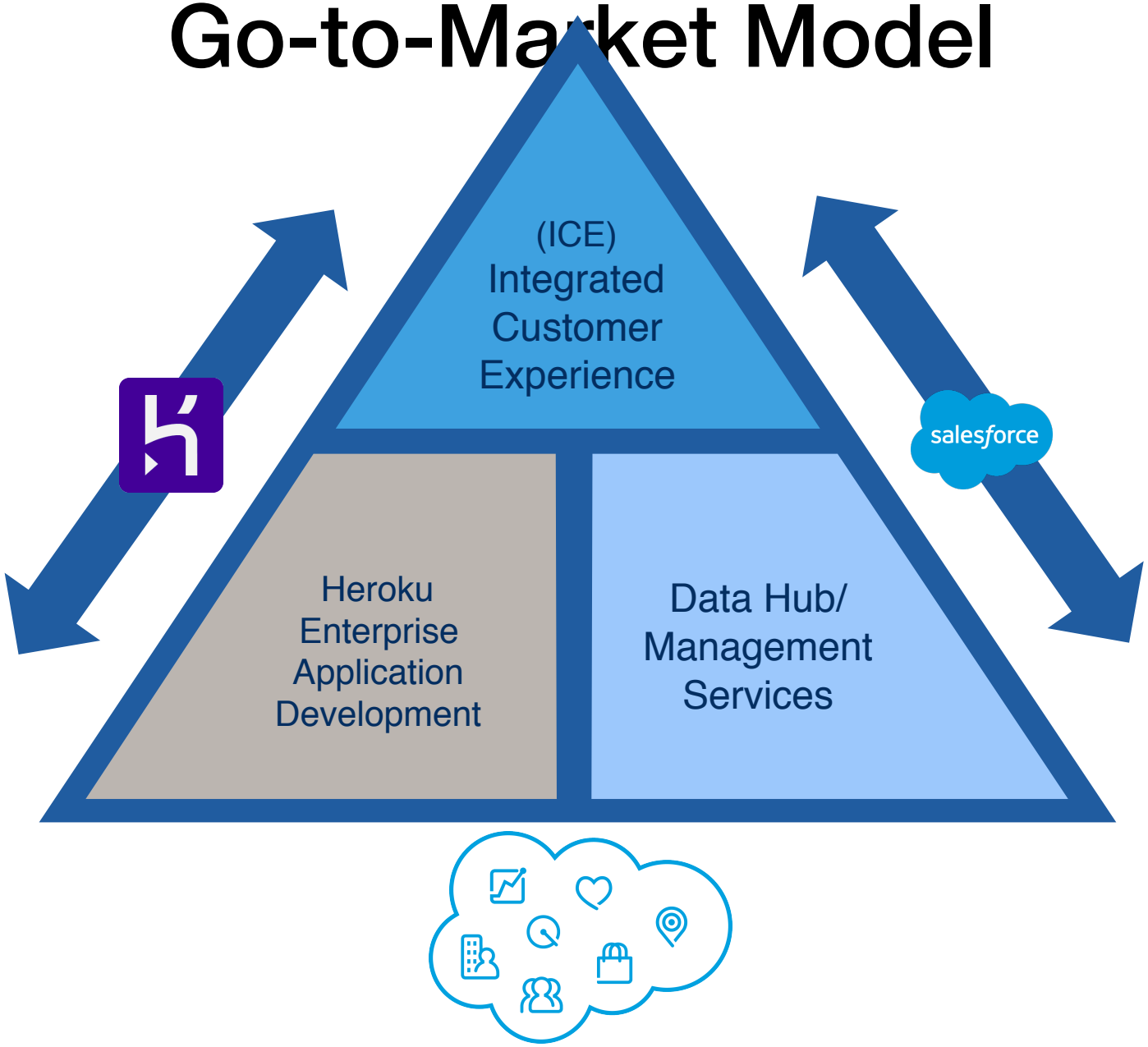


PaaS

No Code / Low Code
Solve for the Developer Gap

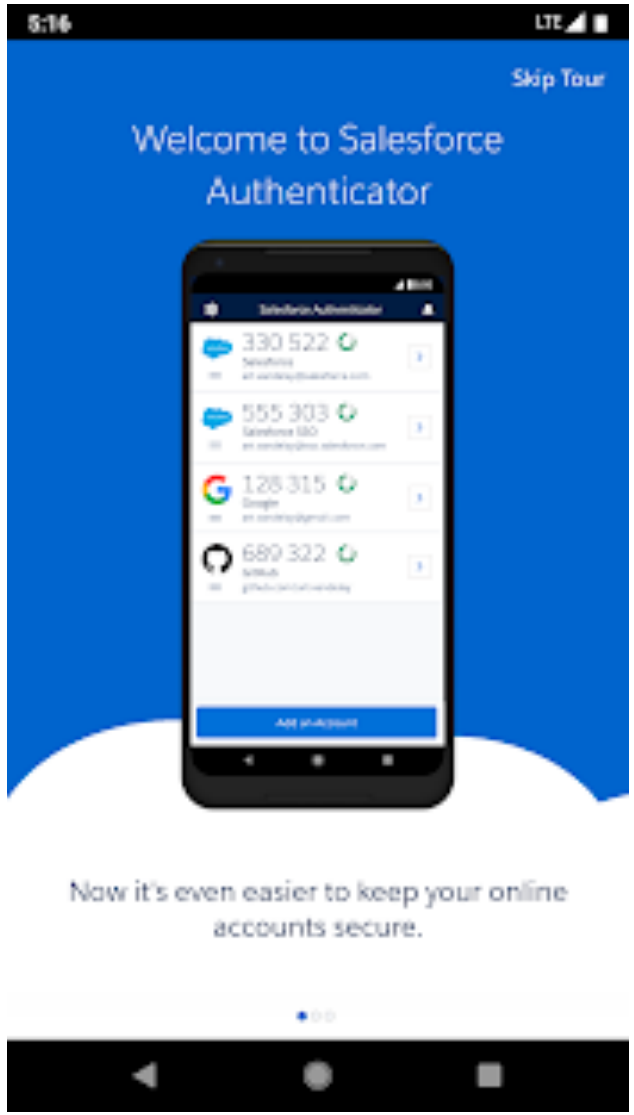
Pro Code
Build Innovative, Engaging Apps

Go-to-Market Model

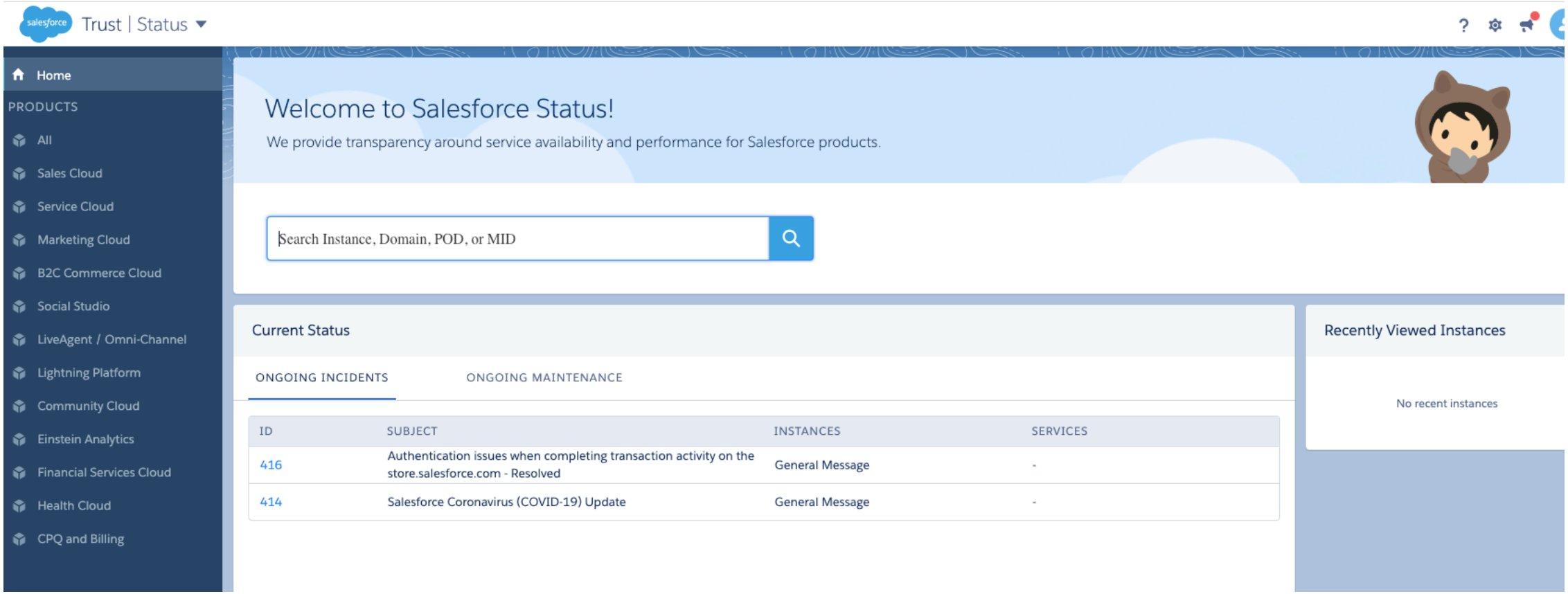


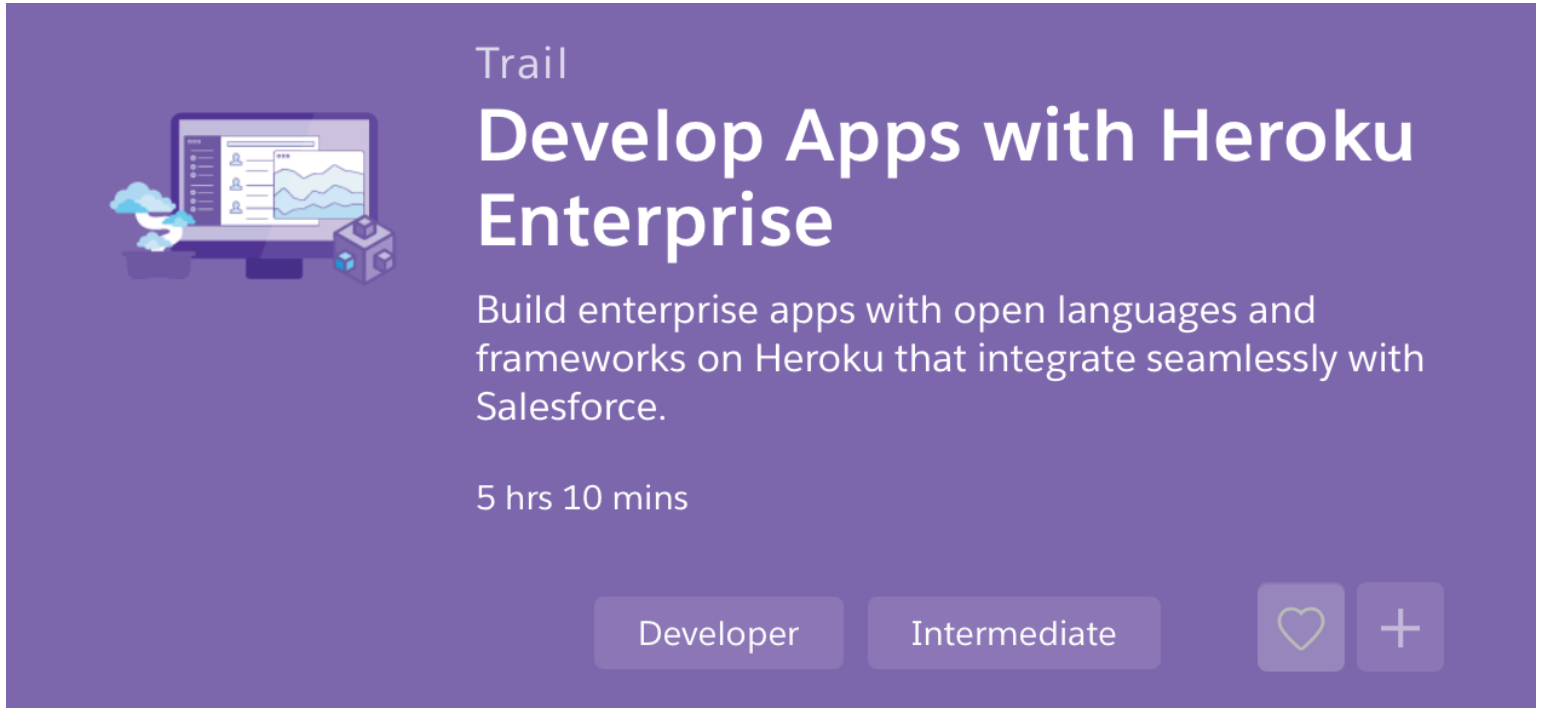
Salesforce DX

Salesforce Authenticator

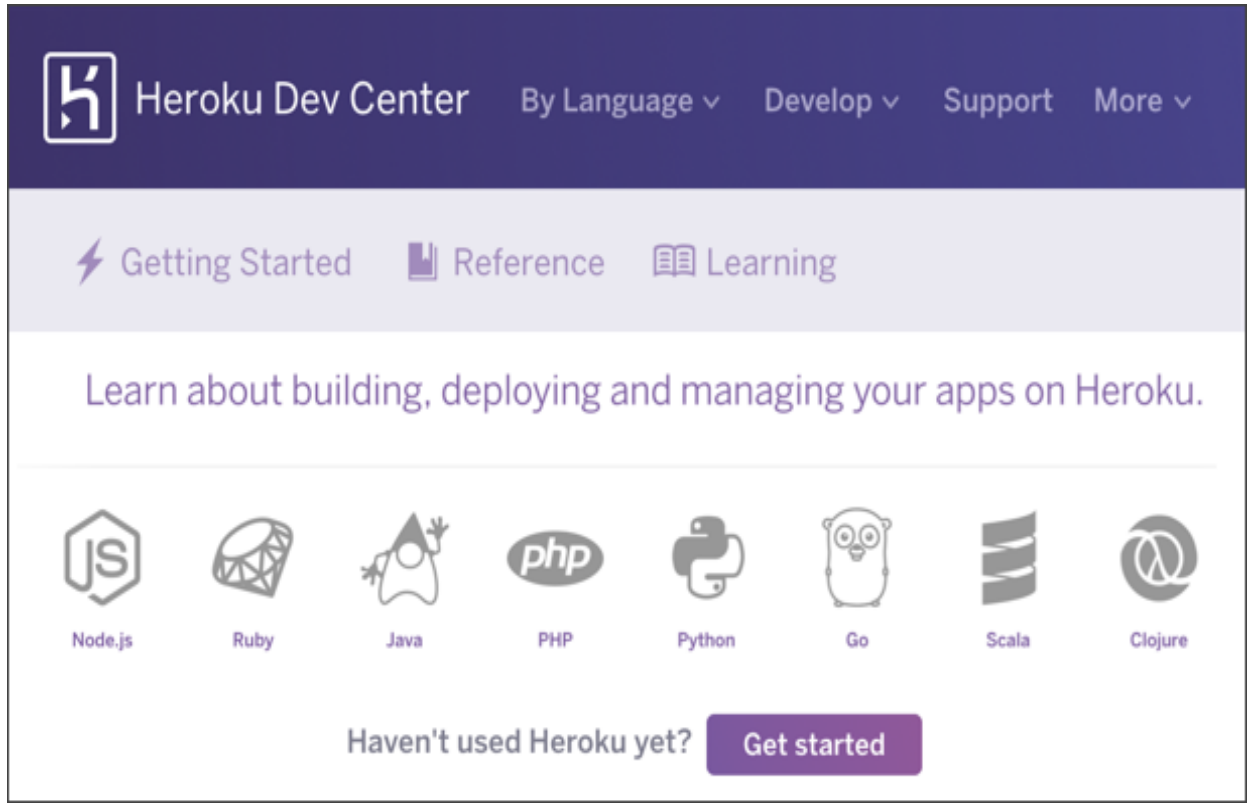


trust.salesforce.com

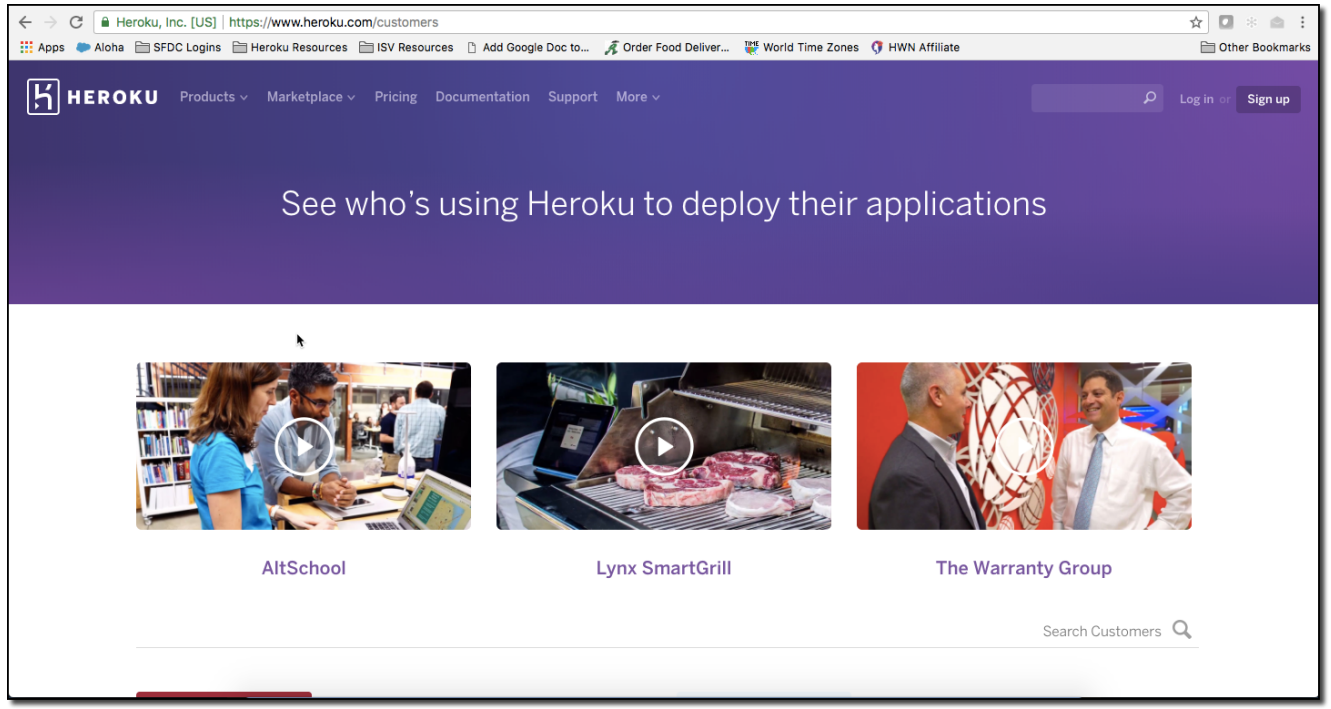




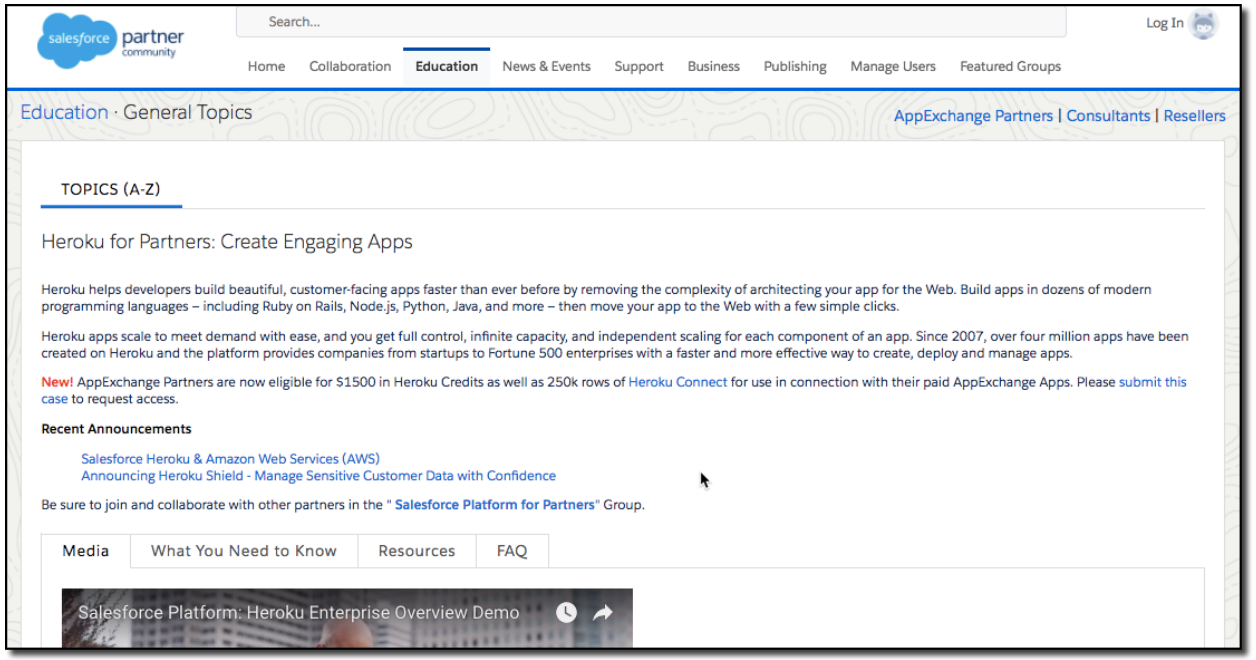
https://trailhead.salesforce.com/trails/heroku_enterprise



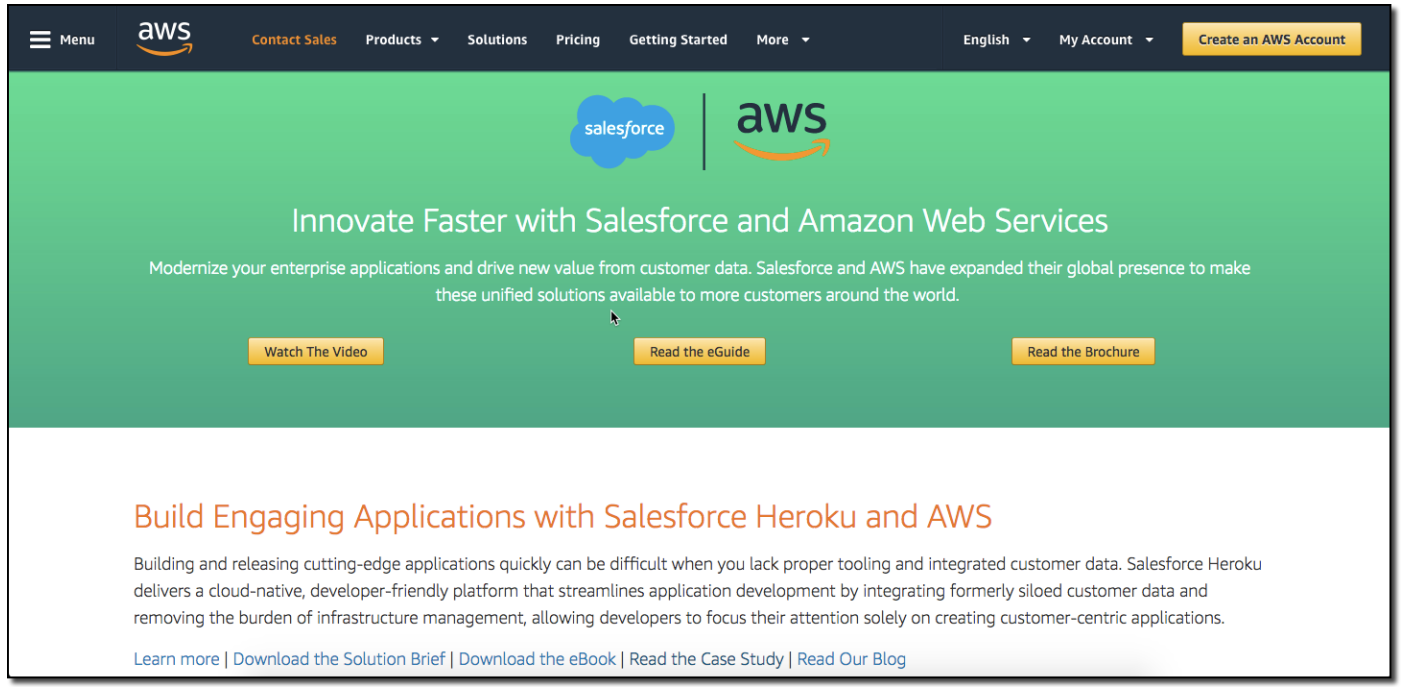
http://devcenter.heroku.com



http://www.heroku.com/customers



http://p.force.com/heroku



http://aws.amazon.com/featured-partners/Salesforce

Thanks

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https://www.productivecloudinnovation.com/lessons