



PLATFORMS AT TWILIO

UNLOCKING DEVELOPER EFFECTIVENESS



Justin Kitagawa

Senior Director, Platform Engineering

San Francisco Bay Area

Add profile section ▼

More...



Twilio Inc.



University of California, San Diego



See contact info



See connections (500+)



See connections (500+)

Specialties: Distributed computing, cloud computing, service oriented architectures, micro-service development, agile development, containers, virtualization, engineering management, technology leadership, API development

Experience



Senior Director :: Platform Engineering
Twilio Inc.

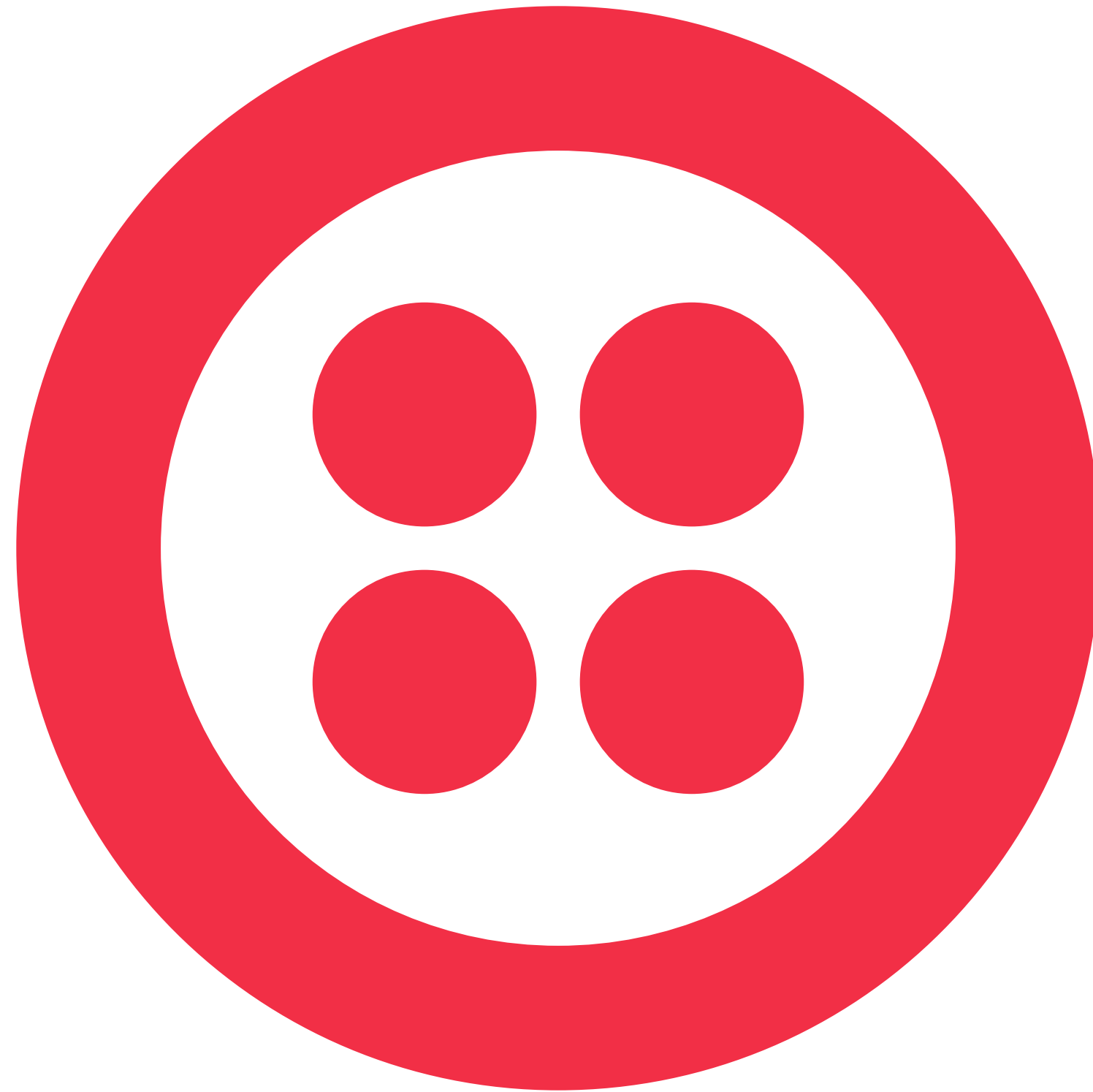


JUSTIN KITAGAWA

PLATFORM LEADER | TWILIO

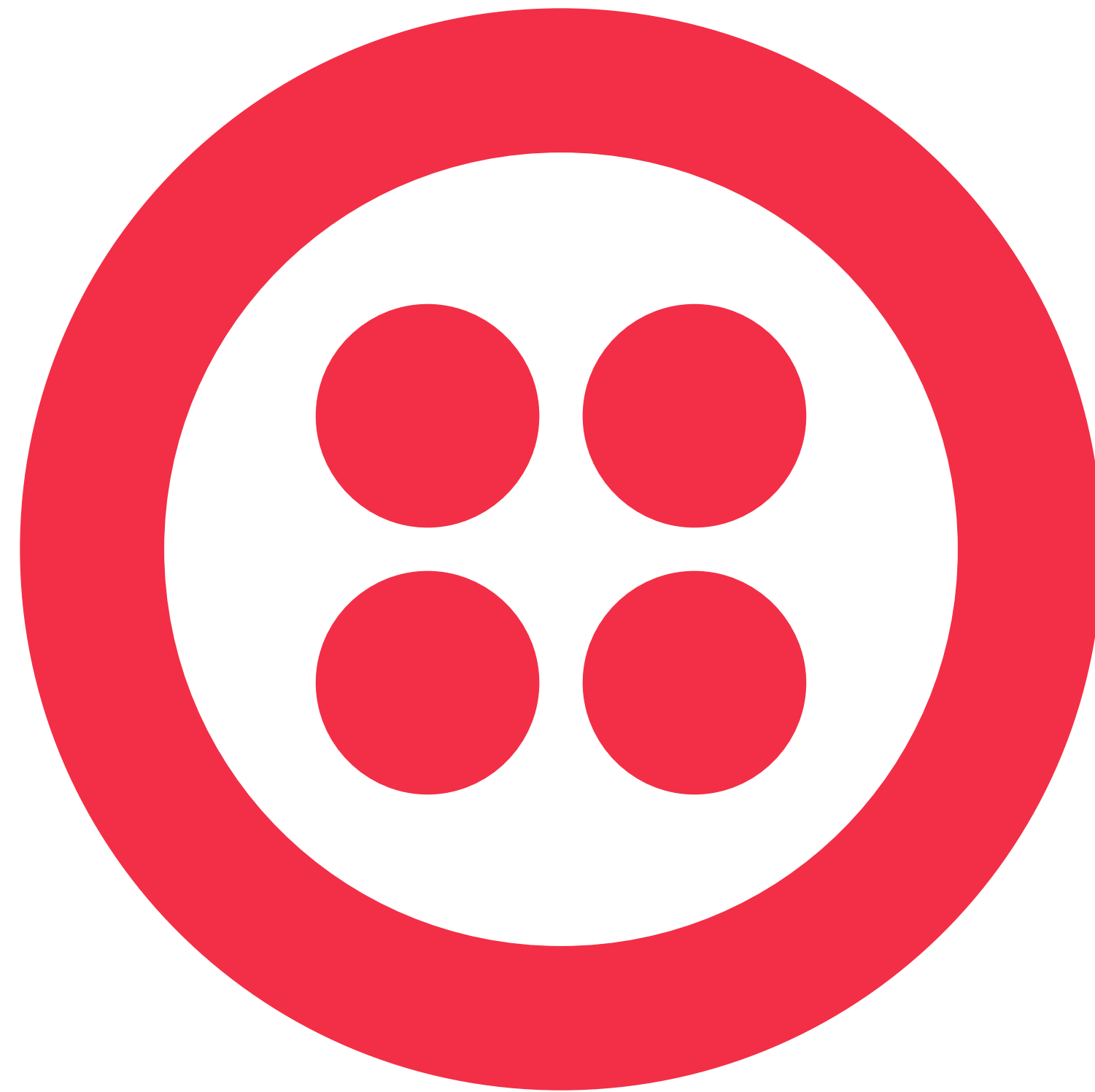


WHO HAS HEARD OF TWILIO?



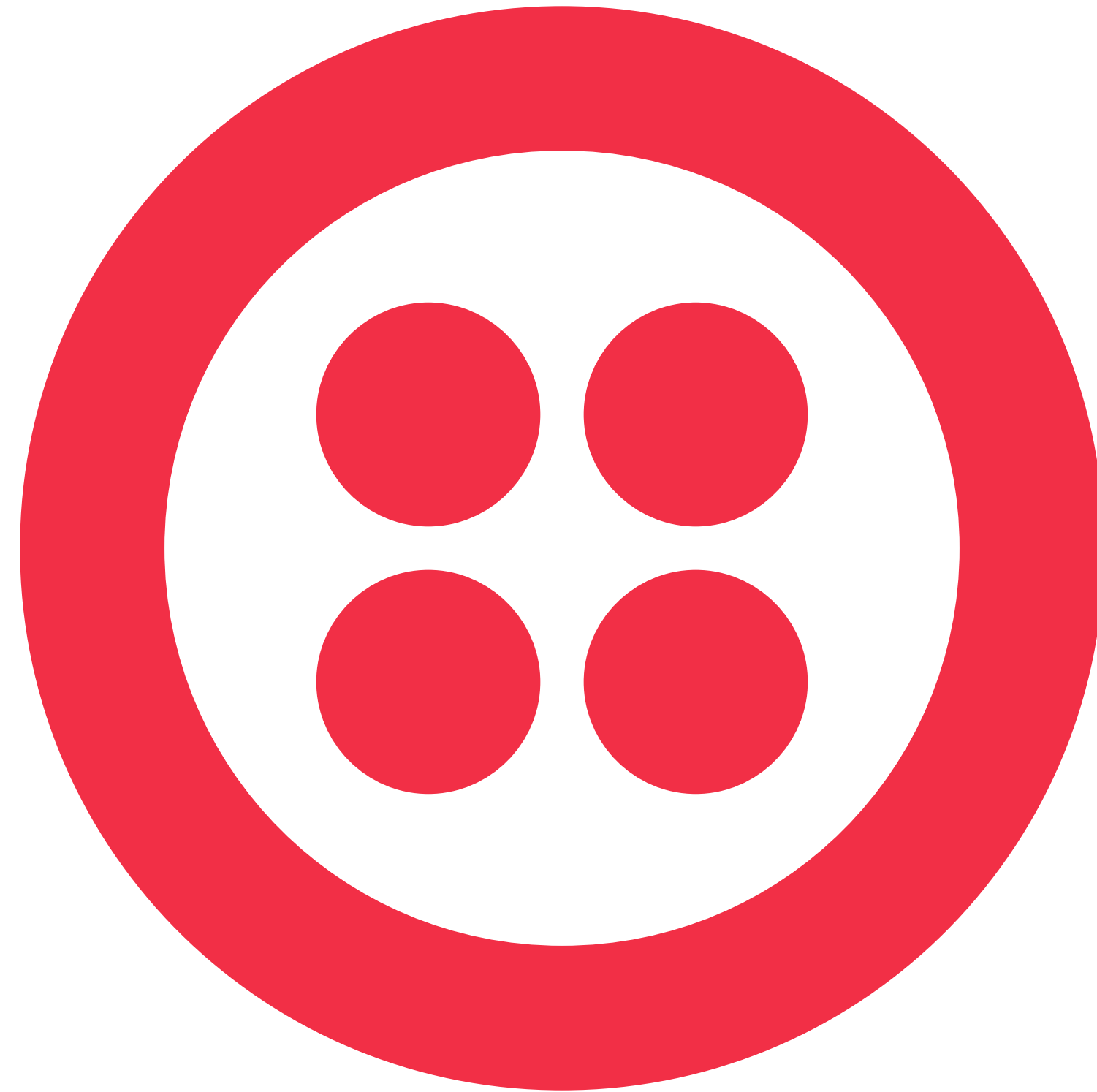


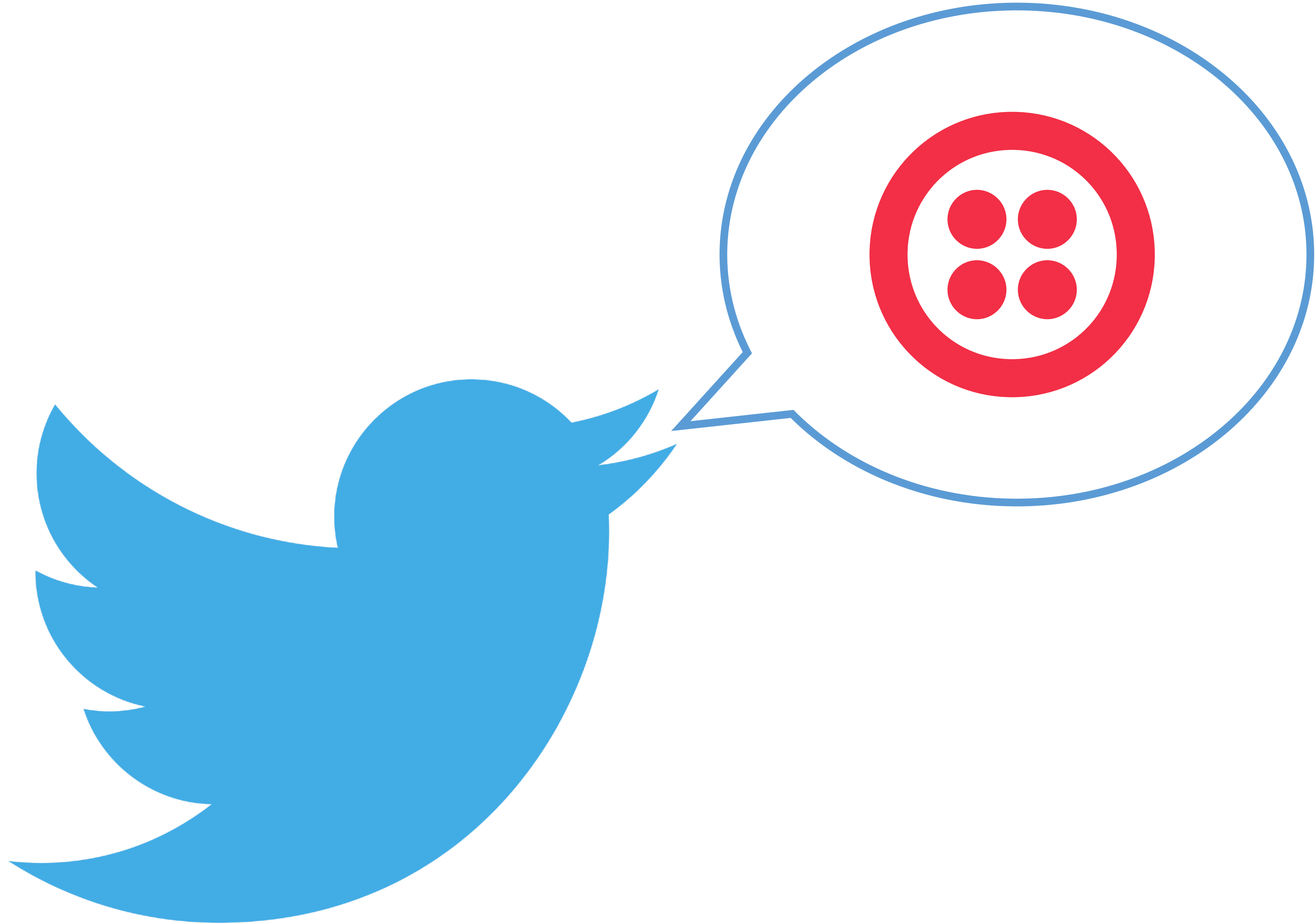
WHO HAS USED TWILIO?





WHAT DOES TWILIO MAKE YOU THINK OF?







Aurooba Ahmed @aurooba · Jun 8

Just finished integrating [@twilio](#) with WordPress for a client and I have to say, the service and API were a pleasure to work with! So simple and clean.



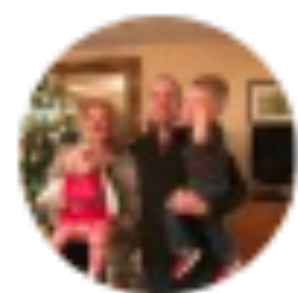
4



2



22



Ryan Kauffman

@RyanKauffman80

Follow

Replying to [@aurooba](#) [@twilio](#)

[@twilio](#) API is fantastic! :)

Translate Tweet

12:29 PM - 8 Jun 2018 from [Naperville, IL](#)

1 Like



1





Myles Eftos

@madpilot

Follow

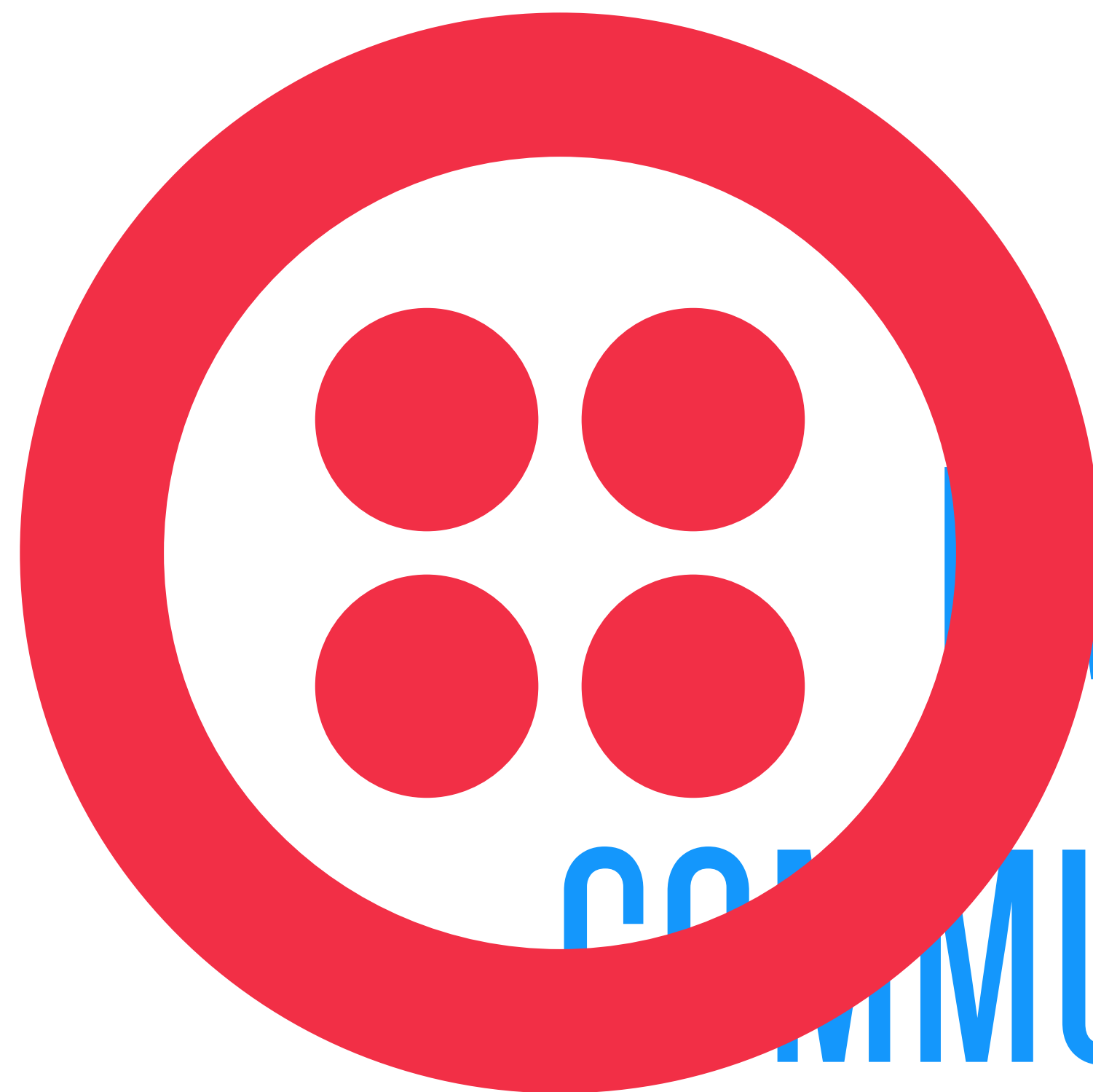


.@twilio is 👉. Just built an entire IVR, answering service and outgoing call recorder in a day.

7:47 PM - 14 Jun 2018 from [West Footscray, Melbourne](#)

5 Retweets 26 Likes





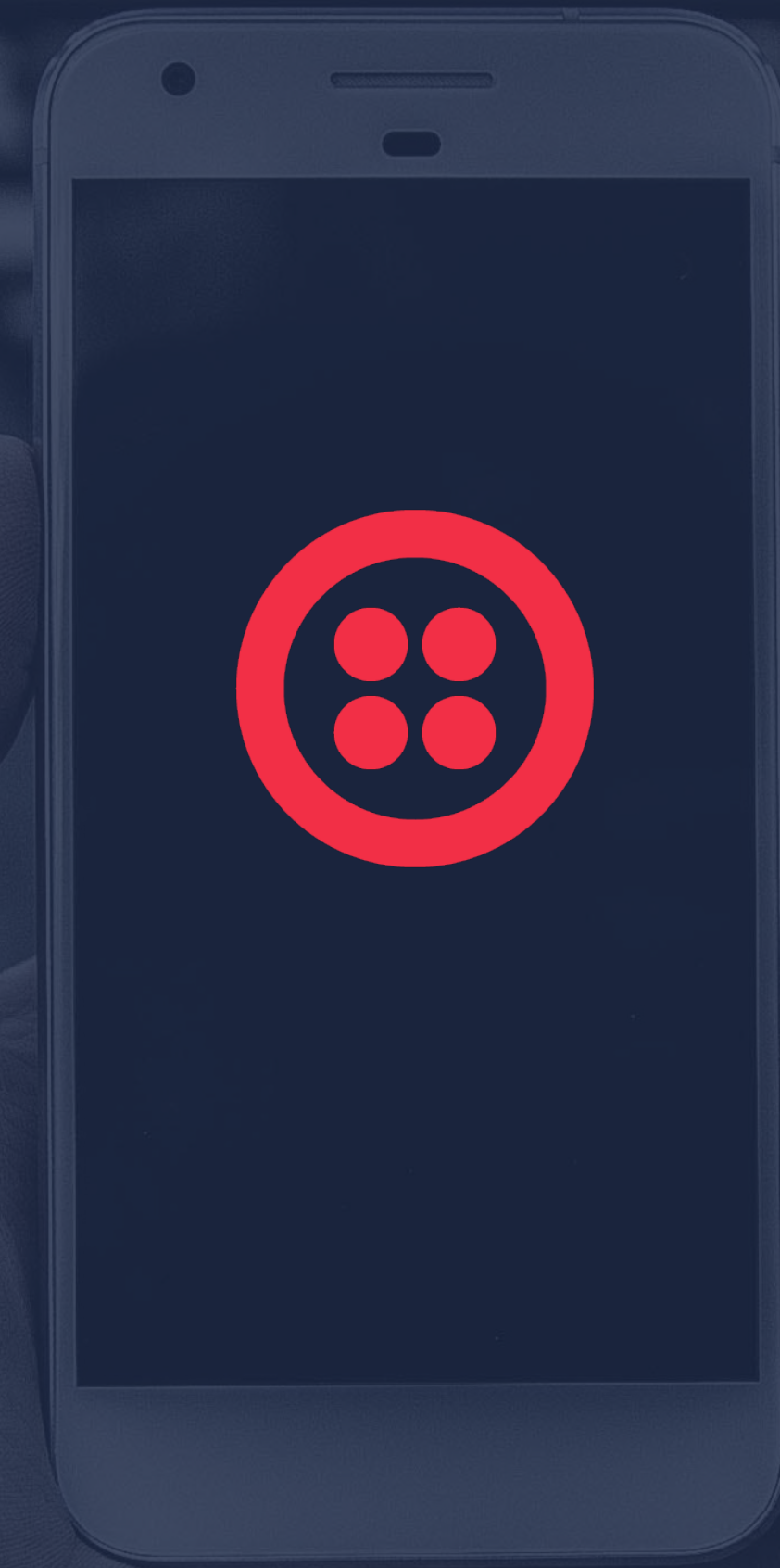
SIMPLE

EASY TO USE

COMMUNICATION APIS



WE ARE A CLOUD COMMUNICATIONS PLATFORM
THAT ENABLES COMPANIES TO
BUILD, SCALE, AND OPERATE ANY
COMMUNICATIONS EXPERIENCE USING APIS.





SEND AN SMS MESSAGE

- Python Helper Library
- Easy!

```
from twilio.rest import Client

# Your Account SID from twilio.com/console
account_sid = "ACXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
# Your Auth Token from twilio.com/console
auth_token = "your_auth_token"

client = Client(account_sid, auth_token)

message = client.messages.create(
    to="+15558675309",
    from_="+15017250604",
    body="Hello, QCON New York!")

print(message.sid)
```



MAKE A PHONE CALL

- Java Helper Library
- Still easy with only a bit more code!

```
import java.net.URI;
import java.net.URISyntaxException;
import com.twilio.Twilio;
import com.twilio.rest.api.v2010.account.Call;
import com.twilio.type.PhoneNumber;

public class Example {
    // Find your Account Sid and Token at twilio.com/user/account
    public static final String ACCOUNT_SID =
        "ACXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX";
    public static final String AUTH_TOKEN = "your_auth_token";

    public static void main(String[] args)
        throws URISyntaxException {
        Twilio.init(ACCOUNT_SID, AUTH_TOKEN);

        Call call = Call.creator(
            new PhoneNumber("+14155551212"),
            new PhoneNumber("+15017122661"),
            new URI("http://demo.twilio.com/docs/
voice.xml")).create();


        System.out.println(call.getSid());
    }
}
```








Engagement Cloud


API platforms for the entire customer journey


 **Twilio Flex** New
The cloud contact center platform


 **Studio**
A drag-and-drop visual builder for Twilio


 **Notify**
Notifications coordinated across multiple channels

 **TaskRouter**
Skills-based routing for your contact center

 **Authy**
Login security for online accounts and transactions


 **Verify**
Identify verification to stop account fraud


 **Proxy**
Phone number privacy for text and voice conversations


 **Understand**
Analyze text using natural language understanding


Communications Cloud


Communications APIs with built-in global intelligence

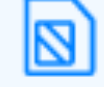
 **Programmable SMS**
API for text messaging

 **Programmable Voice**
API for phone calling

 **Programmable Video**
SDKs and infrastructure for real-time video


 **Programmable Chat**
SDKs for full-featured web and mobile chat


 **Programmable Fax**
API to send and receive faxes


 **Programmable Wireless**
API for cellular communication with connected devices


Super Network


Infrastructure that catalogs, orchestrates, and delivers the world's connectivity

 **Elastic SIP Trunking**
Global voice connectivity for VoIP infrastructure

 **Phone Numbers**
Local, national, mobile, and toll-free numbers


 **Short Codes**
Send high volume text and picture messages


 **Interconnect**
A private connection to the Twilio Cloud

 **Lookup**
Know the details behind every phone number

Runtime

Tools to build, scale, and operate your app

 **Functions**
A serverless environment to build and run your Twilio code

 **Sync**
Synchronize state across your web and mobile apps



TWILIO ENGINEERING



TWO PIZZA TEAMS

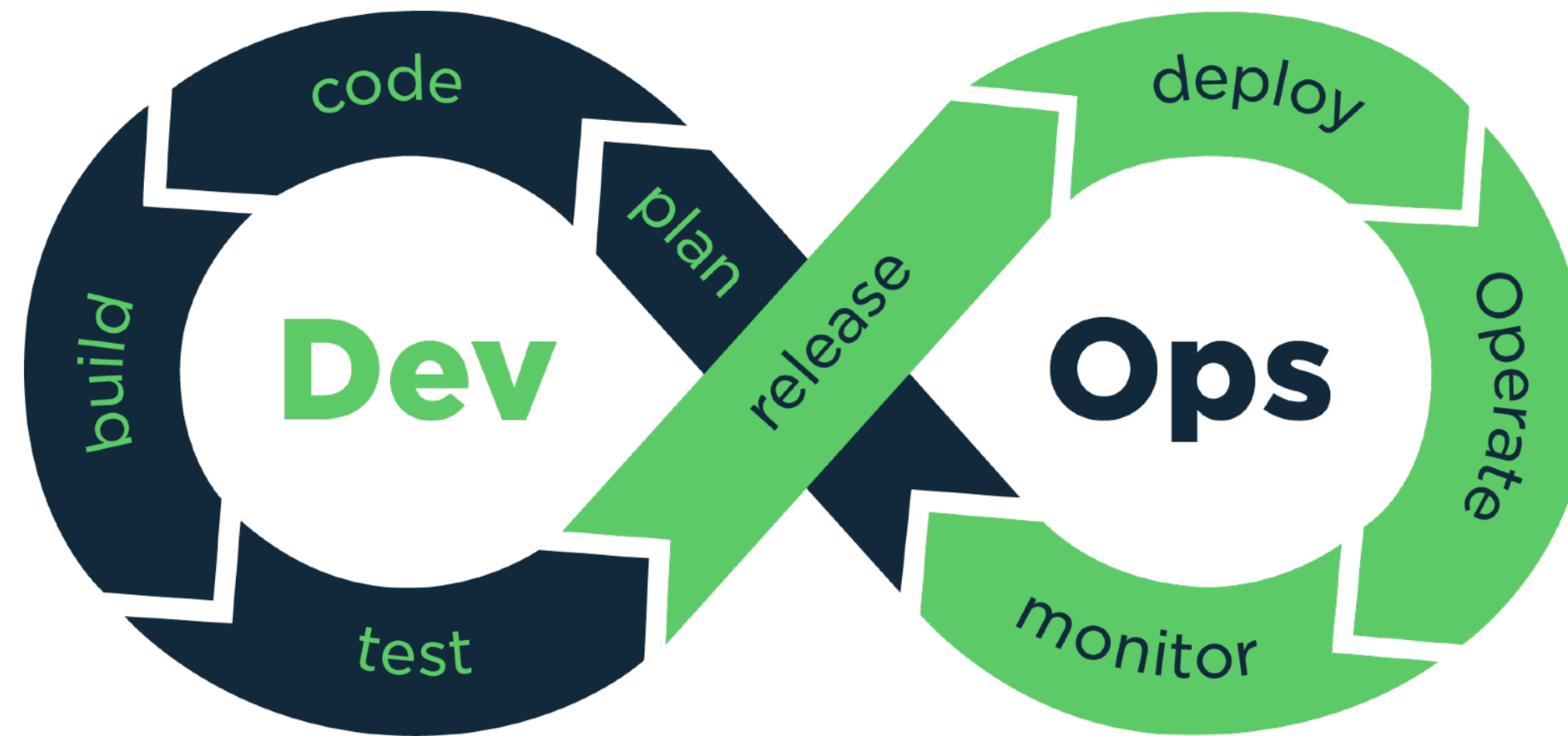


POLYGLOT **MICROSERVICES**





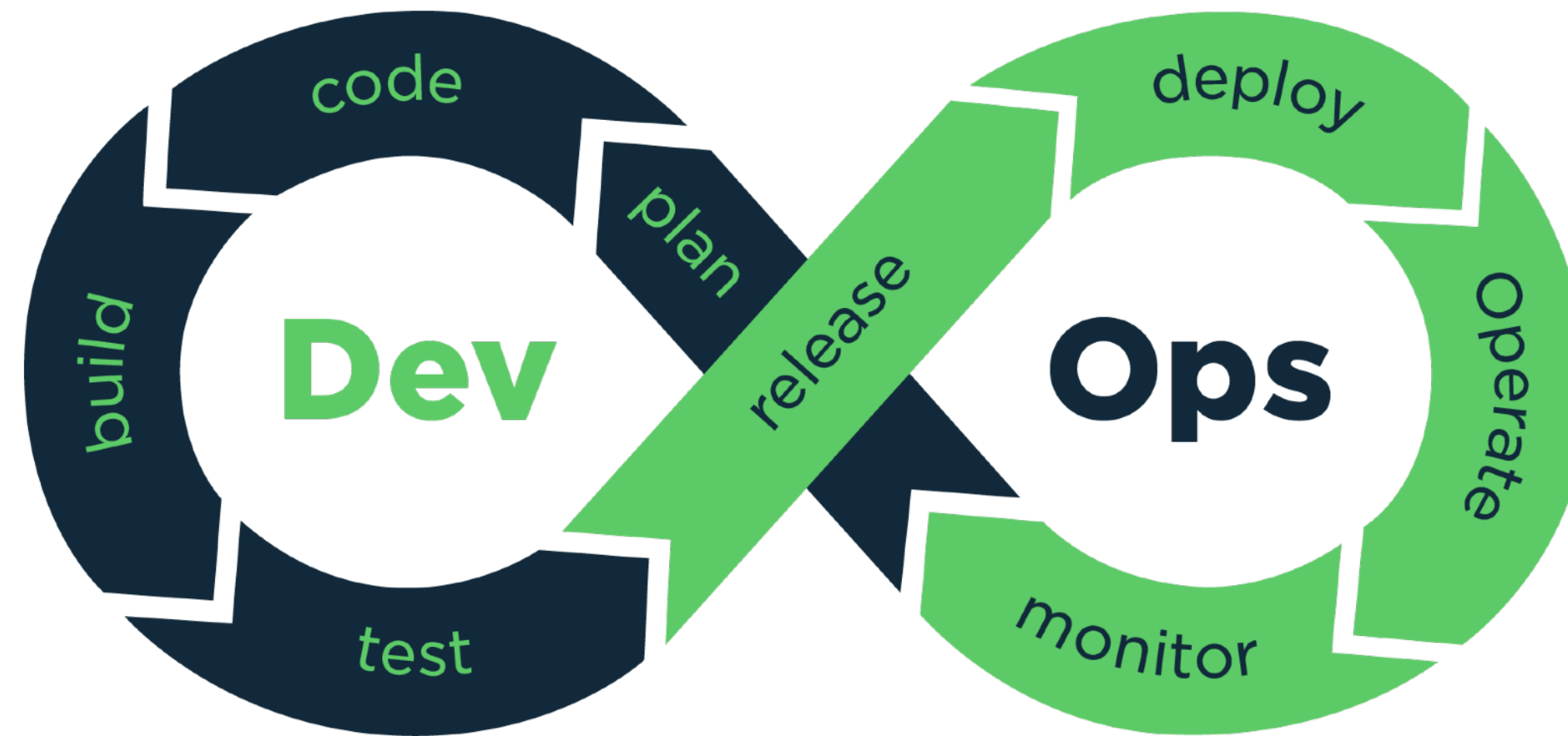
STRONG

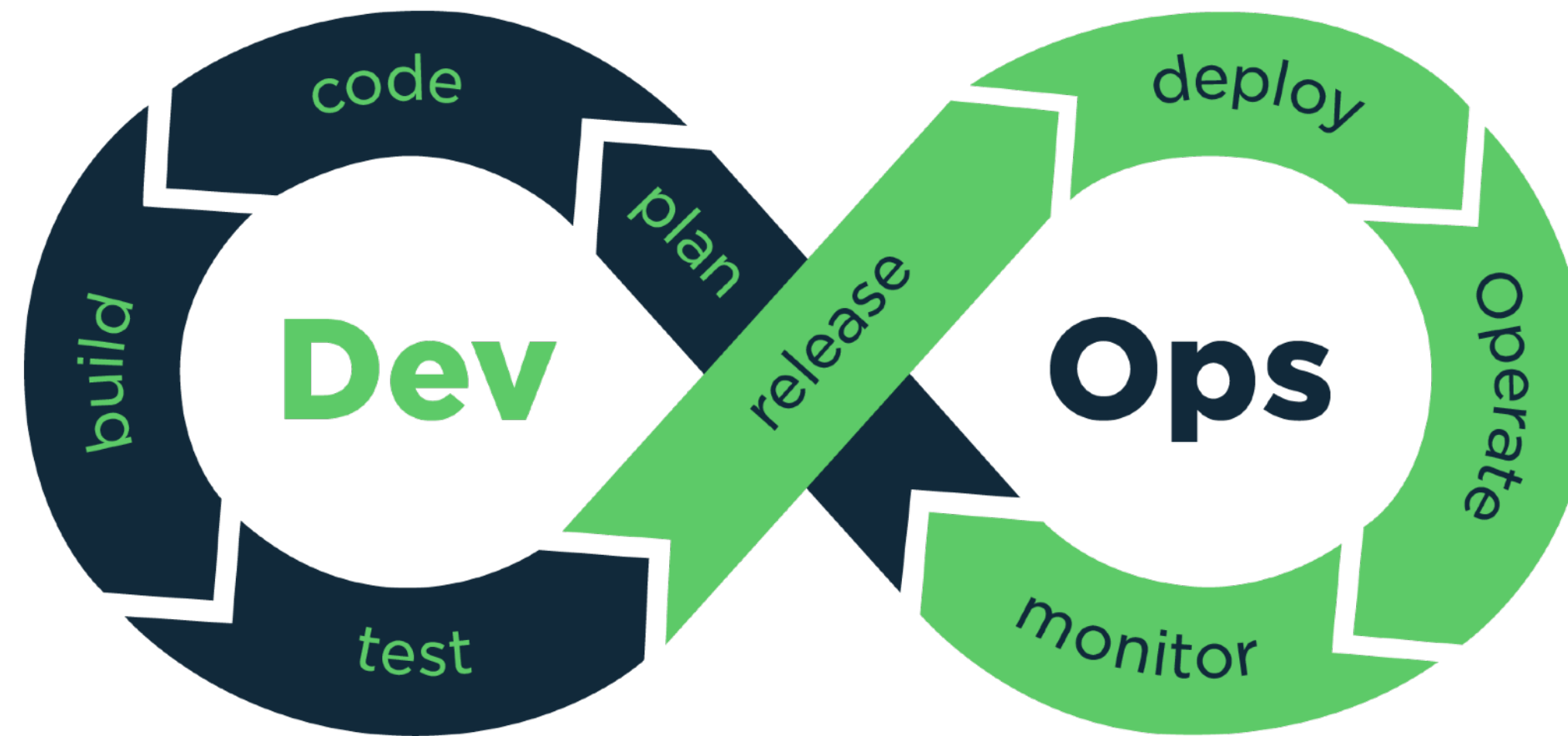


CULTURE



YOU BUILD IT, YOU RUN IT





VETERANS

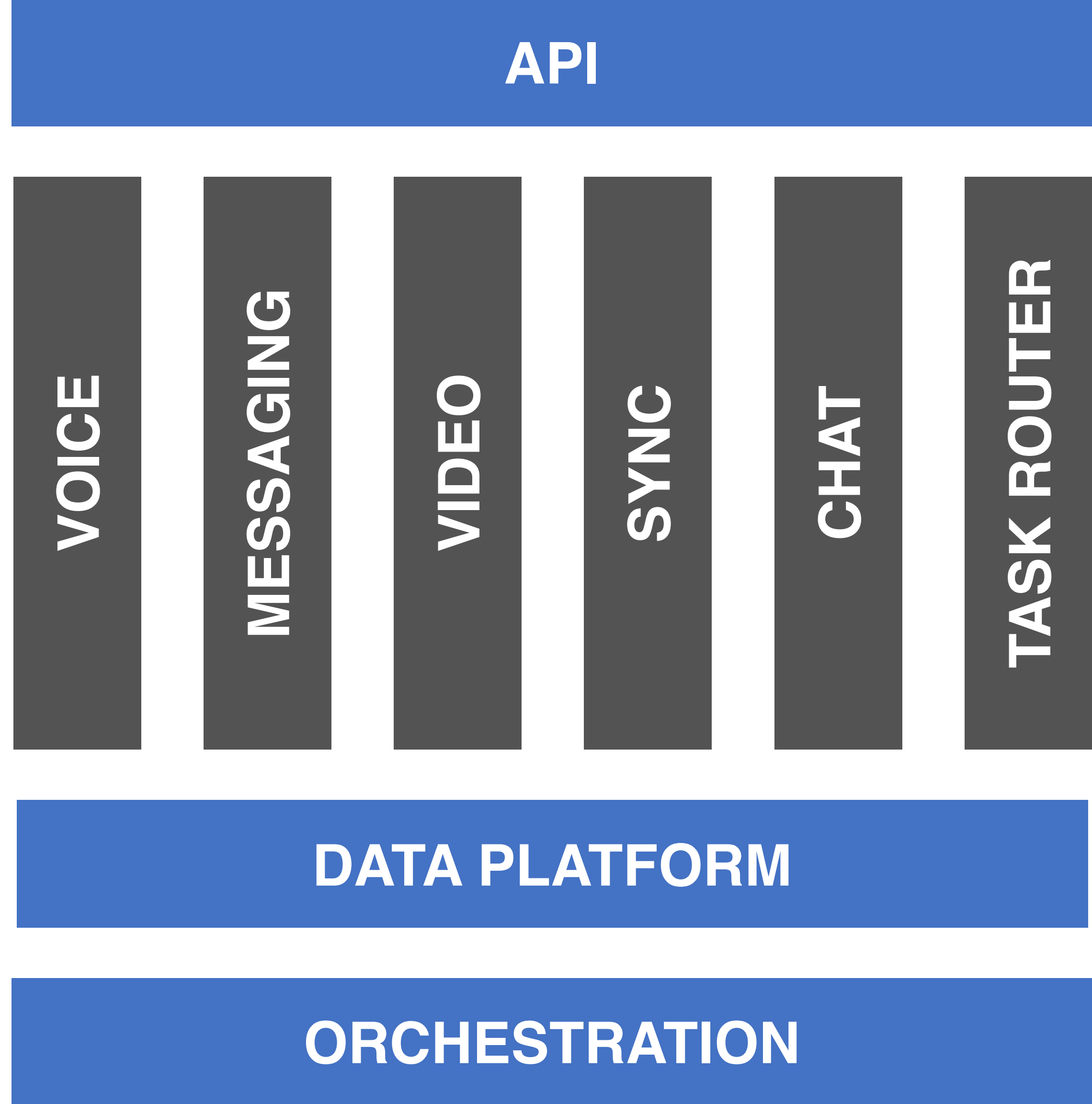


VERTICAL

HORIZONTAL



VERTICAL





HORIZONTAL

API

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTING

DATA PLATFORM

ORCHESTRATION

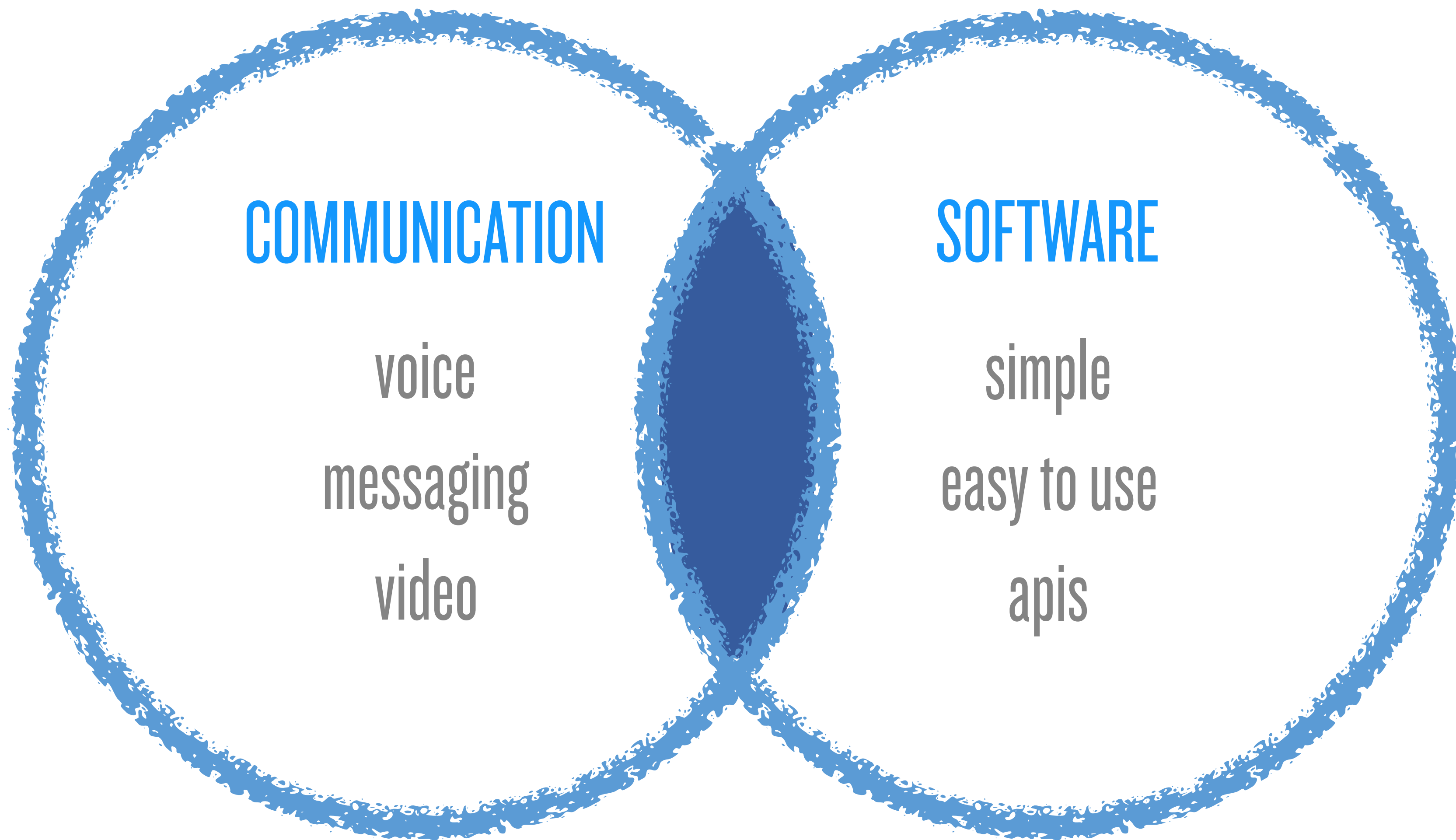


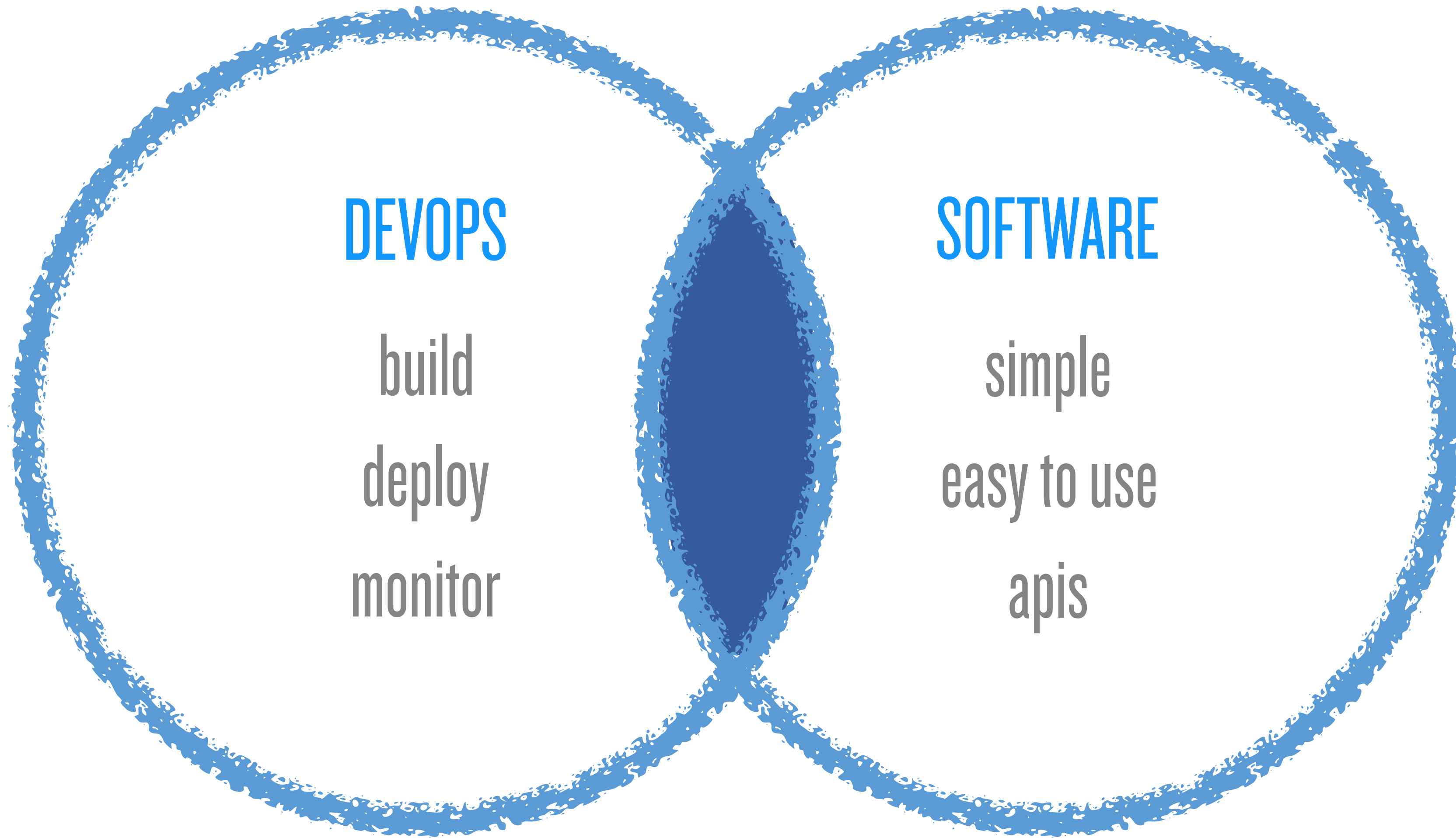
PLATFORM

API

DATA PLATFORM

ORCHESTRATION







TWILIO FOR TWILIO



DEPLOYMENTS PER DAY

100



DEPLOYMENTS PER YEAR

30,000+



DAYS BETWEEN FEATURES

2





NOT ALWAYS BEEN THIS WAY



IMPERATIVE INFRASTRUCTURE AS CODE



CONSULTATIVE PLATFORM



IT WASN'T THAT GOOD



264,000 5XXS / QUARTER

99.73% SUCCESS RATE



GATEKEEPERS



LACK OF EMPATHY



TOOLING VENDOR SPRAWL









PHILOSOPHICAL SHIFT



API FIRST



SELF-SERVICE

OVER

GATEKEEPERS



DECLARATIVE

OVER

IMPERATIVE



BUILT

WITH

EMPATHY





API FIRST

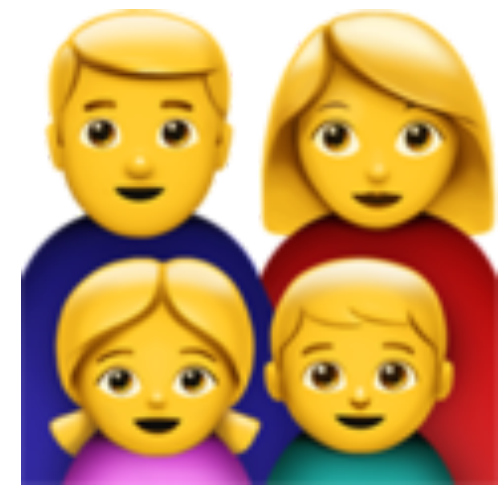




STRONG INTERFACES



VENDOR **INDIRECTION**



POLYGLOT FRIENDLY



CONTROL PLANE CONSISTENCY



BUILT-IN VALIDATION

- HTTP has rich comprehensive set of error codes
- Meaningful payload messages

400	Bad Request
401	Unauthorized
403	Forbidden
404	Not Found
405	Method Not Allowed
409	Conflict
412	Precondition Failed
423	Locked
424	Failed Dependency



SELF-SERVICE

OVER

GATEKEEPERS



*Even well-meaning
gatekeepers slow
innovation.*

JEFF BEZOS | AMAZON





FLOW





DECLARATIVE

OVER

IMPERATIVE



THE WHAT

OVER

THE HOW



DATA MODELS

OVER

CODE



PLATFORM EXECUTES THE HOW



UNKNOWN UNKNOWN



EVOLVING BEST PRACTICES





PROXY

- Set up a proxy phone number
- 3 lines of ruby

```
# Create a proxy conversation session

reservation = service.sessions.create(
  unique_name: "reservation_12345"
)

host = session.participants.create(
  identifier: "+12345678901")
guest = session.participants.create(
  identifier: "+12345678902")
```





TWILIO API



STARSHIP



API

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARTUP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



STATEMENTS OF WORK



CYCLE TIME

=

WEEKS TO MONTHS



DECLARATIVE API MODEL



API DEFINITIONS



API DEFINITIONS

- Each resource has a file
- Teams own their definitions

```
jtop:api-definitions jkitagawa$ tree .
.
├── README.md
├── accounts
│   ├── changes.md
│   └── v1
│       ├── credential.json
│       ├── credential_aws.json
│       └── credential_public_key.json
├── versions.json
└── api
    ├── changes.md
    └── v2010
        ├── account.json
        ├── address.json
        ├── application.json
        ├── authorized_connect_app.json
        ├── available_phone_number_country.json
        ├── available_phone_number_local.json
        ├── available_phone_number_mobile.json
        ├── available_phone_number_national.json
        ├── available_phone_number_shared_cost.json
        ├── available_phone_number_toll_free.json
        ├── available_phone_number_voip.json
        ├── call.json
        ├── call_feedback.json
        └── call_feedback_summary.json
```

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CALL.JSON

- Location contains the Resources:
 - API Domain
 - API Version
 - API Paths to List and Instance

```
{
  "class_name": "call",
  "mount_name": "calls",
  "file_name": "call",
  "library_visibility": "public",
  "maturity": "ga",
  "location": {
    "protocol": "https",
    "domain": "api.twilio.com",
    "version": "2010-04-01",
    "list": "/Accounts/{account_sid}/Calls.json",
    "instance": "/Accounts/{account_sid}/Calls/{sid}.json"
  },
  "enums": {
    "event": [
      "initiated",
      "ringing",
      "answered",
      "completed"
    ],
    "status": [
      "queued",
      "ringing",
      "in-progress",
      "completed",
      "busy",
      "failed",
      "no-answer",

```



CALL.JSON

- Enums used by the resource

```
{
  "class_name": "call",
  "mount_name": "calls",
  "file_name": "call",
  "library_visibility": "public",
  "maturity": "ga",
  "location": {
    "protocol": "https",
    "domain": "api.twilio.com",
    "version": "2010-04-01",
    "list": "/Accounts/{account_sid}/Calls.json",
    "instance": "/Accounts/{account_sid}/Calls/{sid}.json"
  },
  "enums": {
    "event": [
      "initiated",
      "ringing",
      "answered",
      "completed"
    ],
    "status": [
      "queued",
      "ringing",
      "in-progress",
      "completed",
      "busy",
      "failed",
      "no-answer",

```



CALL.JSON

- Properties and types of the resource

```
    "update_status": [  
      "canceled",  
      "completed"  
    ]  
  },  
  "properties": {  
    "account_sid": "sid<AC>",  
    "annotation": "string",  
    "answered_by": "string",  
    "api_version": "string",  
    "caller_name": "string",  
    "date_created": "date_time<rfc2822>",  
    "date_updated": "date_time<rfc2822>",  
    "direction": "string",  
    "duration": "string",  
    "end_time": "date_time<rfc2822>",  
    "forwarded_from": "string",  
    "from": "string",  
    "from_formatted": "string",  
    "group_sid": "sid<GP>",  
    "parent_call_sid": "sid<CA>",  
    "phone_number_sid": "sid<PN>",
```



CALL.JSON

- Metadata for the actions of the resource

```
"actions": {
  "create": {
    "method": "post",
    "location": "list",
    "params": {
      "required": {
        "to": {
          "type": "endpoint",
          "api_required": false
        },
        "from": {
          "type": "phone_number",
          "api_required": false
        }
      }
    },
    "conditional": [
      {
        "url": "url",
        "application_sid": "sid<AP>"
      }
    ],
    "optional": {
      "method": "http_method",
      "fallback_url": "url",
      "fallback_method": "http_method",
    }
  }
}
```



ENABLED SELF-SERVICE



IMPROVED SECURITY



SELF-SERVICE REFACTORING





SHADOW

STARSHIP

VOICE

MESSAGING

VIDEO

SYNC

CHAT

TASK ROUTER



SHADOW

STARSHIP

VOICE V1

VOICE V2



STARSHIP

VOICE V1

VOICE V2



DIFF THE RESPONSES



STARSHIP

VOICE V1

VOICE V2



STARSHIP

VOICE V1

VOICE V2



SWITCH

STARSHIP

VOICE V1

VOICE V2



CUSTOMER A



VOICE V1

VOICE V2



STARSHIP

VOICE V1

VOICE V2



CUSTOMER B



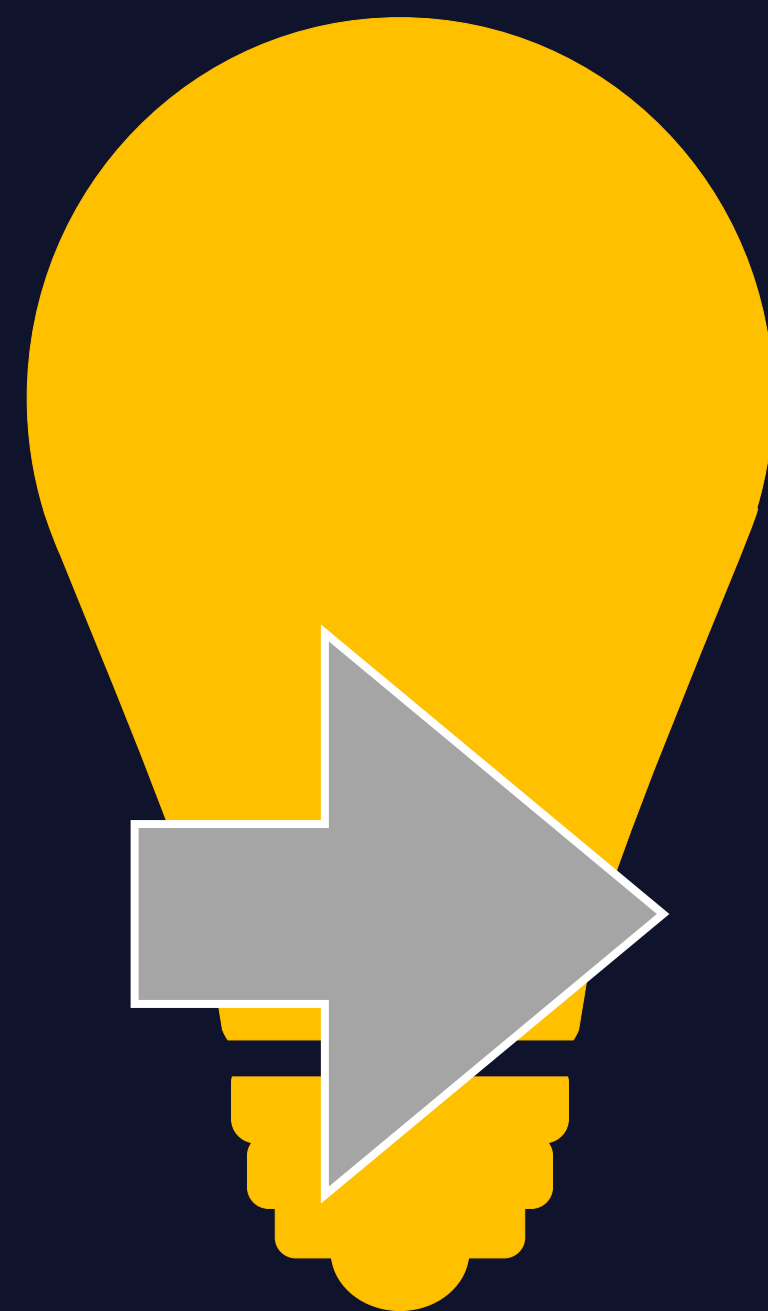
VOICE V1

VOICE V2





HELPER LIBRARY DRIFT



NEW API



TWILIO-JAVA



TWILIO-CSHARP



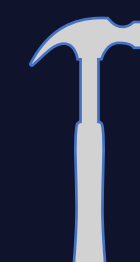
TWILIO-PHP



TWILIO-RUBY



TWILIO-PYTHON



TWILIO-NODE



TWILIO-JAVA



TWILIO-CSHARP



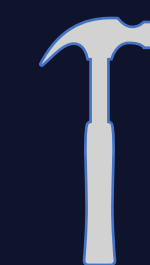
TWILIO-PHP



TWILIO-RUBY



TWILIO-PYTHON



TWILIO-NODE



TWILIO-JAVA



TWILIO-CSHARP



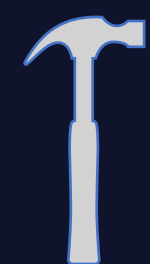
TWILIO-PHP



TWILIO-RUBY



TWILIO-PYTHON



TWILIO-NODE





AUTOGENERATED LIBRARIES



YOYO DYNNE



CALLS.JSON

- Enums used by the resource

```
{
  "class_name": "call",
  "mount_name": "calls",
  "file_name": "call",
  "library_visibility": "public",
  "maturity": "ga",
  "location": {
    "protocol": "https",
    "domain": "api.twilio.com",
    "version": "2010-04-01",
    "list": "/Accounts/{account_sid}/Calls.json",
    "instance": "/Accounts/{account_sid}/Calls/{sid}.json"
  },
  "enums": {
    "event": [
      "initiated",
      "ringing",
      "answered",
      "completed"
    ],
    "status": [
      "queued",
      "ringing",
      "in-progress",
      "completed",
      "busy",
      "failed",
      "no-answer",
      "canceled"
    ]
  }
}
```



ACCOUNT/CALL.JAVA

- Java transpired helper library

```
/**
 * This code was generated by
 * \ / ( ) \ ( ) ( | \ | | ( / _ v1.0.0
 * / / / /
 */

package com.twilio.rest.api.v2010.account;

//...

@JsonIgnoreProperties(ignoreUnknown = true)
public class Call extends Resource {
    private static final long serialVersionUID = 194998930798610L;

    public enum Event {
        INITIATED("initiated"),
        RINGING("ringing"),
        ANSWERED("answered"),
        COMPLETED("completed");

//...

    public enum Status {
        QUEUED("queued"),
        RINGING("ringing"),
        IN_PROGRESS("in-progress"),
        COMPLETED("completed"),
        BUSY("busy"),
        FAILED("failed"),
        NO_ANSWER("no-answer"),
        CANCELED("canceled");
    }
}
```



ACCOUNT/CALL/__INIT__.PY

- Python transpired helper library

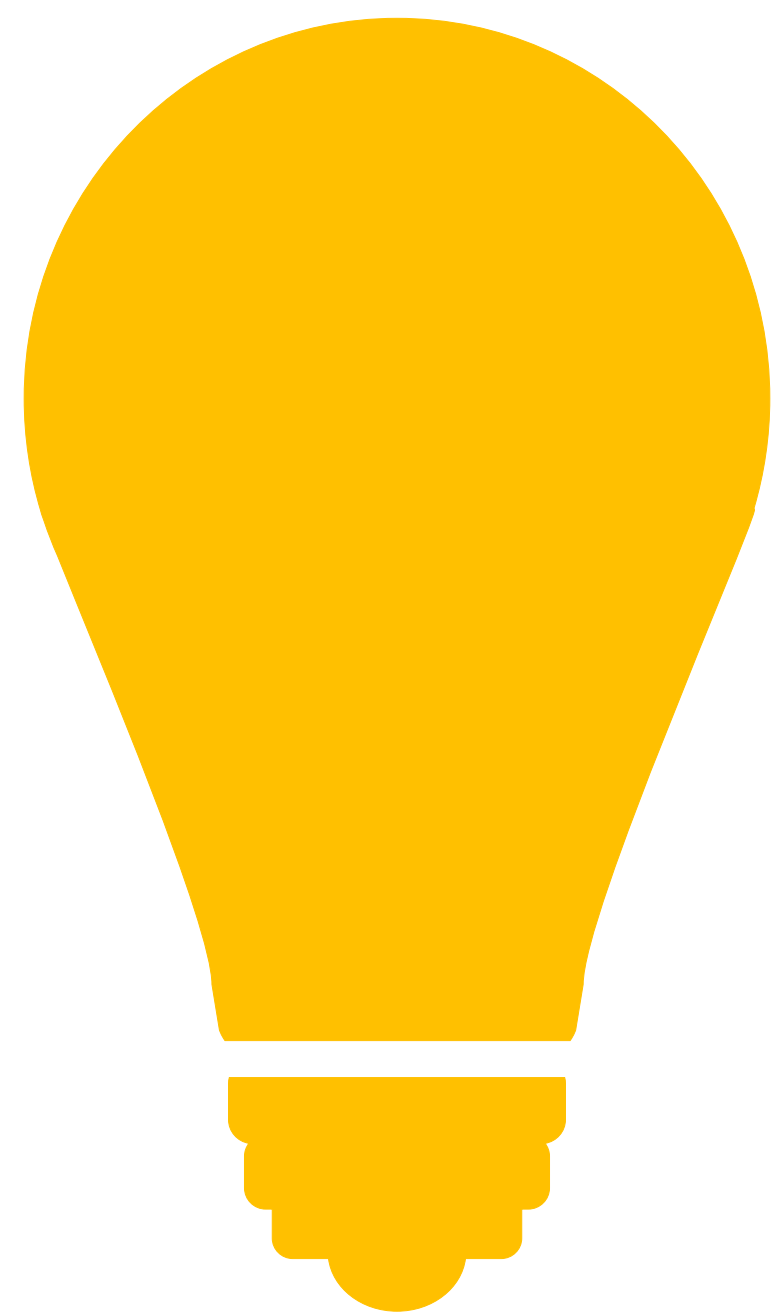
```
# coding=utf-8
"""
This code was generated by
\ / ( ) \ / ( ) ( | \ / | | ( / _ v1.0.0
 / / / / /
"""
#...

class CallInstance(InstanceResource):
    """ """

class Event(object):
    INITIATED = "initiated"
    RINGING = "ringing"
    ANSWERED = "answered"
    COMPLETED = "completed"

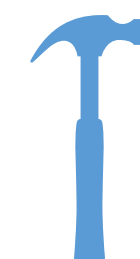
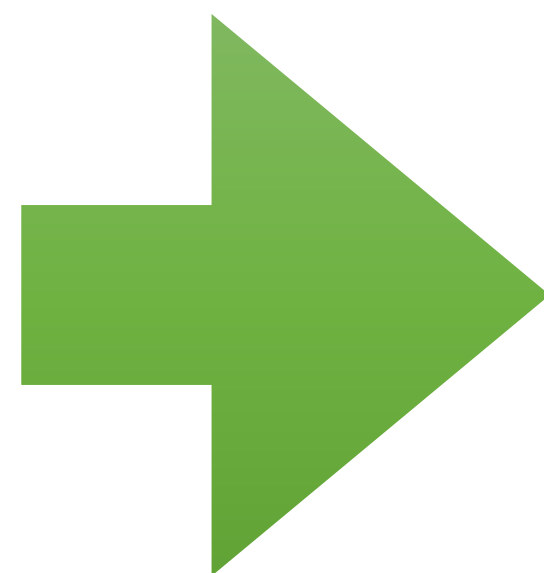
class Status(object):
    QUEUED = "queued"
    RINGING = "ringing"
    IN_PROGRESS = "in-progress"
    COMPLETED = "completed"
    BUSY = "busy"
    FAILED = "failed"
    NO_ANSWER = "no-answer"
    CANCELED = "canceled"

#...
```



NEW API

YOYODYNE



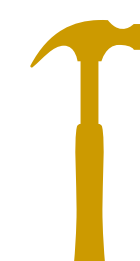
TWILIO-JAVA



TWILIO-CSHARP



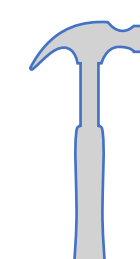
TWILIO-PHP



TWILIO-RUBY



TWILIO-PYTHON



TWILIO-NODE





AUTOGENERATED DOCS



GDPR COMPLIANT



Jeff Lawson ✓

@jeffiel

Following



Today we announced the EU has approved Twilio's Binding Corporate Rules (BCR) governing our data privacy program. BCRs are the gold standard for data protection, only 130 co's globally have obtained this approval. Proud of our team and commitment to trust.

[twilio.com/press/releases ...](https://www.twilio.com/press/releases)

3:54 PM - 8 Jun 2018

21 Retweets 110 Likes



1



21



110





Call properties

NAME	DESCRIPTION
account_sid	The <u>account_sid</u> of the <u>Account</u> responsible for creating this Call. (not PII)
annotation	The annotation provided for the Call (not PII)
answered_by	Either human or machine if this Call was initiated with answering machine detection. Empty otherwise. (not PII)
api_version	The API Version used to create the Call (not PII)
caller_name	The caller's name if this Call was an incoming call to a phone number with Caller ID Lookups enabled. Empty otherwise. (🔒 PII MTL: 120 days)



TWILIO DEPLOYMENTS



DISPOSABLE INFRASTRUCTURE



ZERO DOWNTIME DEPLOYMENTS

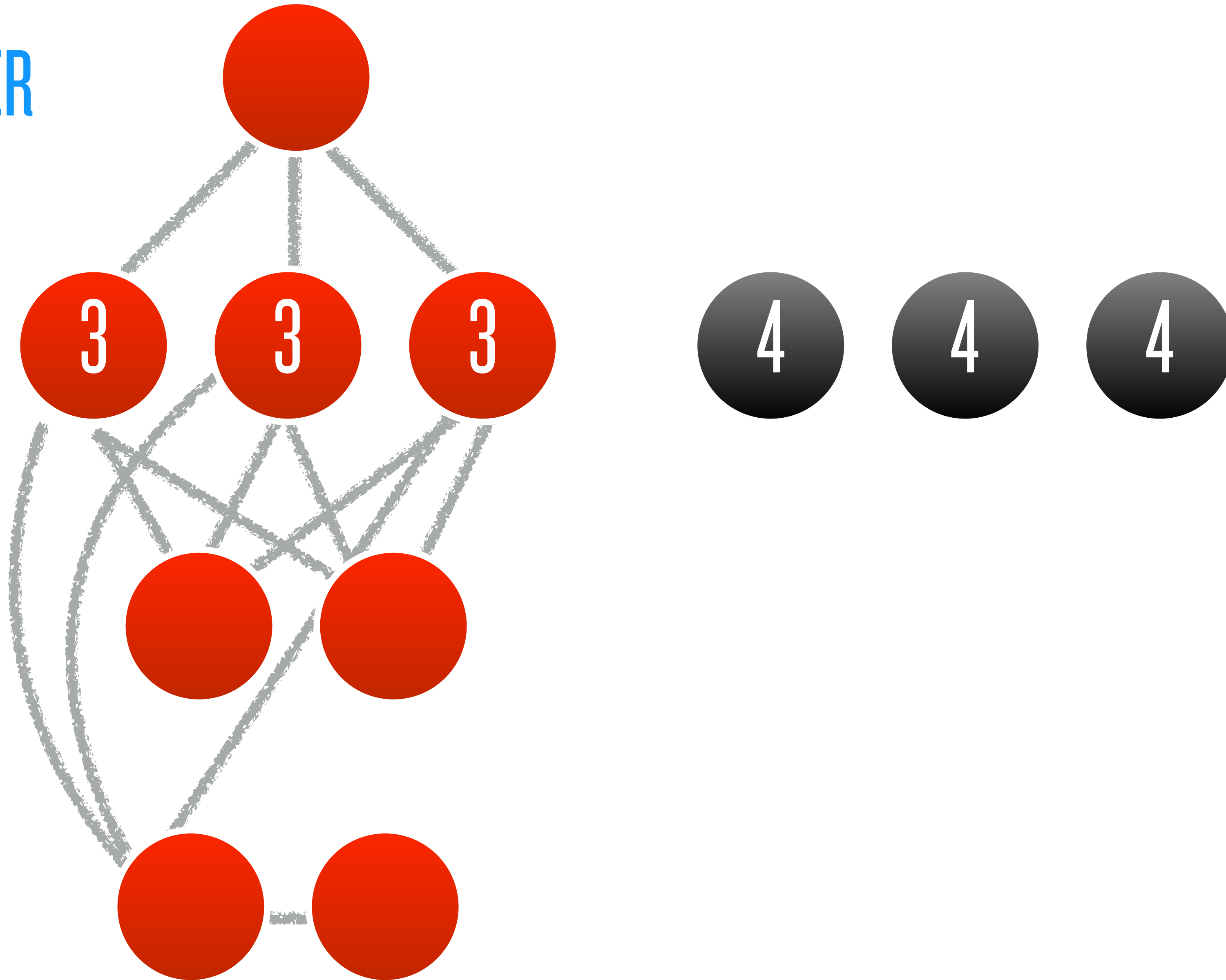


LOAD BALANCER

APPLICATION

CACHE

STORAGE



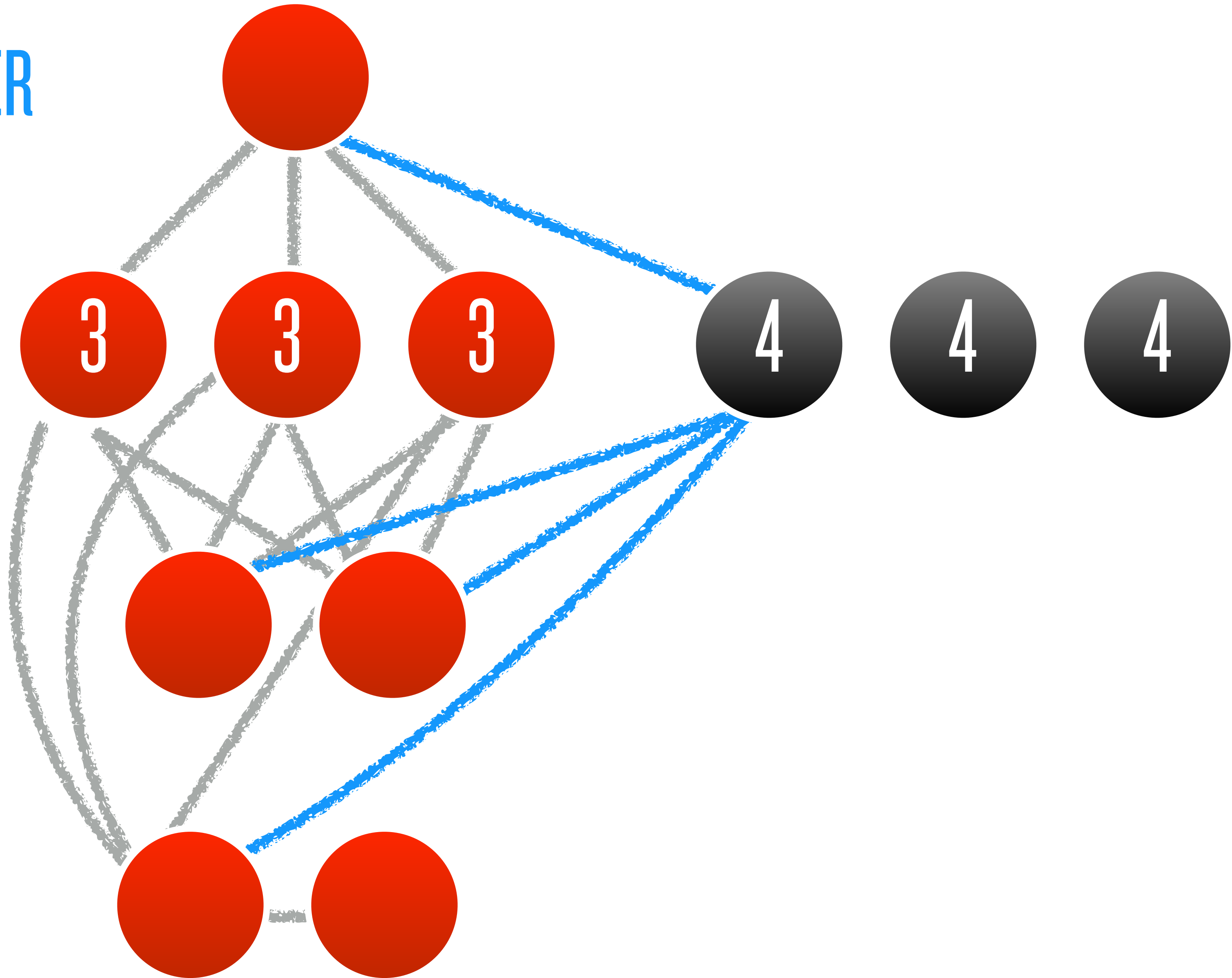


LOAD BALANCER

APPLICATION

CACHE

STORAGE



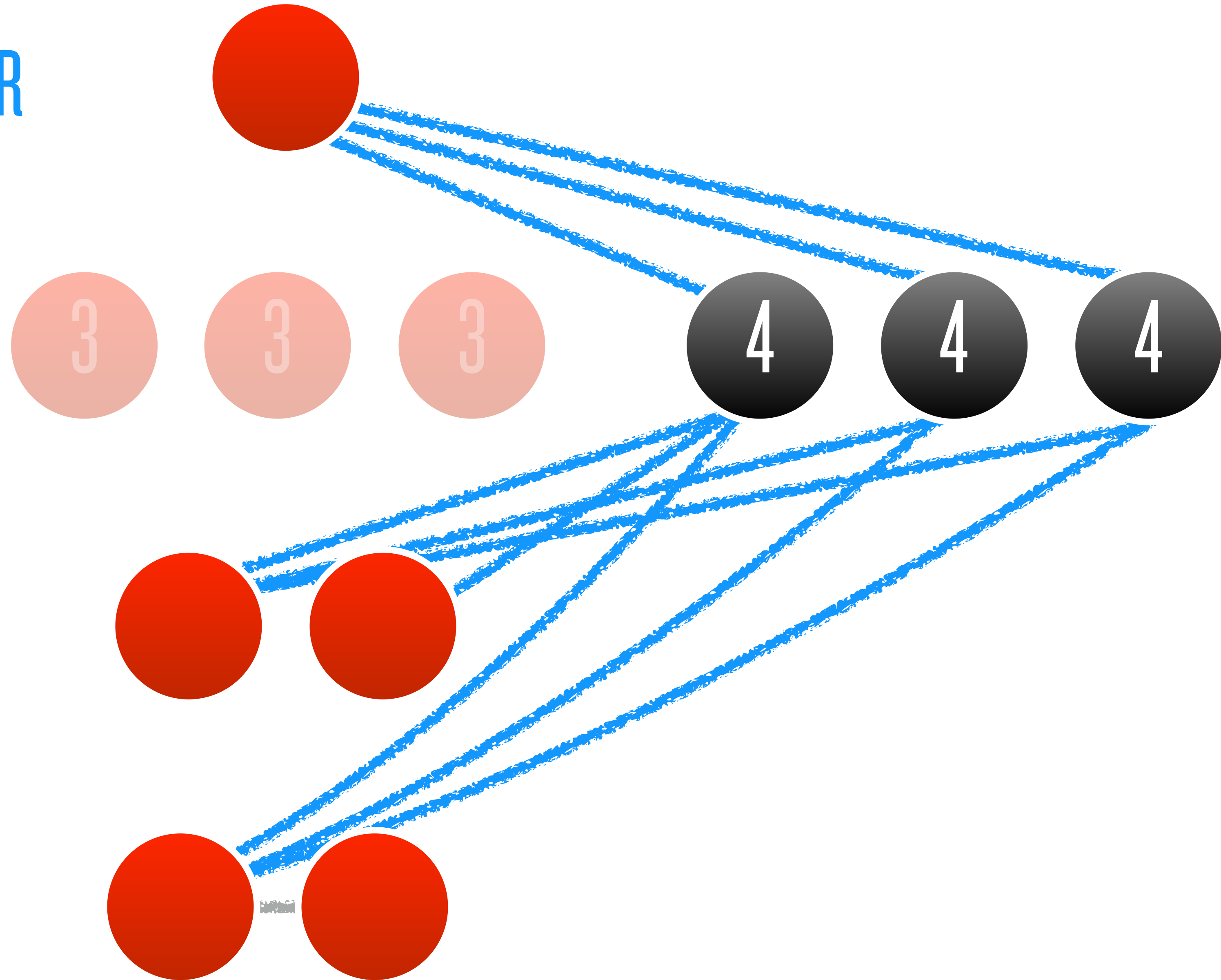


LOAD BALANCER

APPLICATION

CACHE

STORAGE



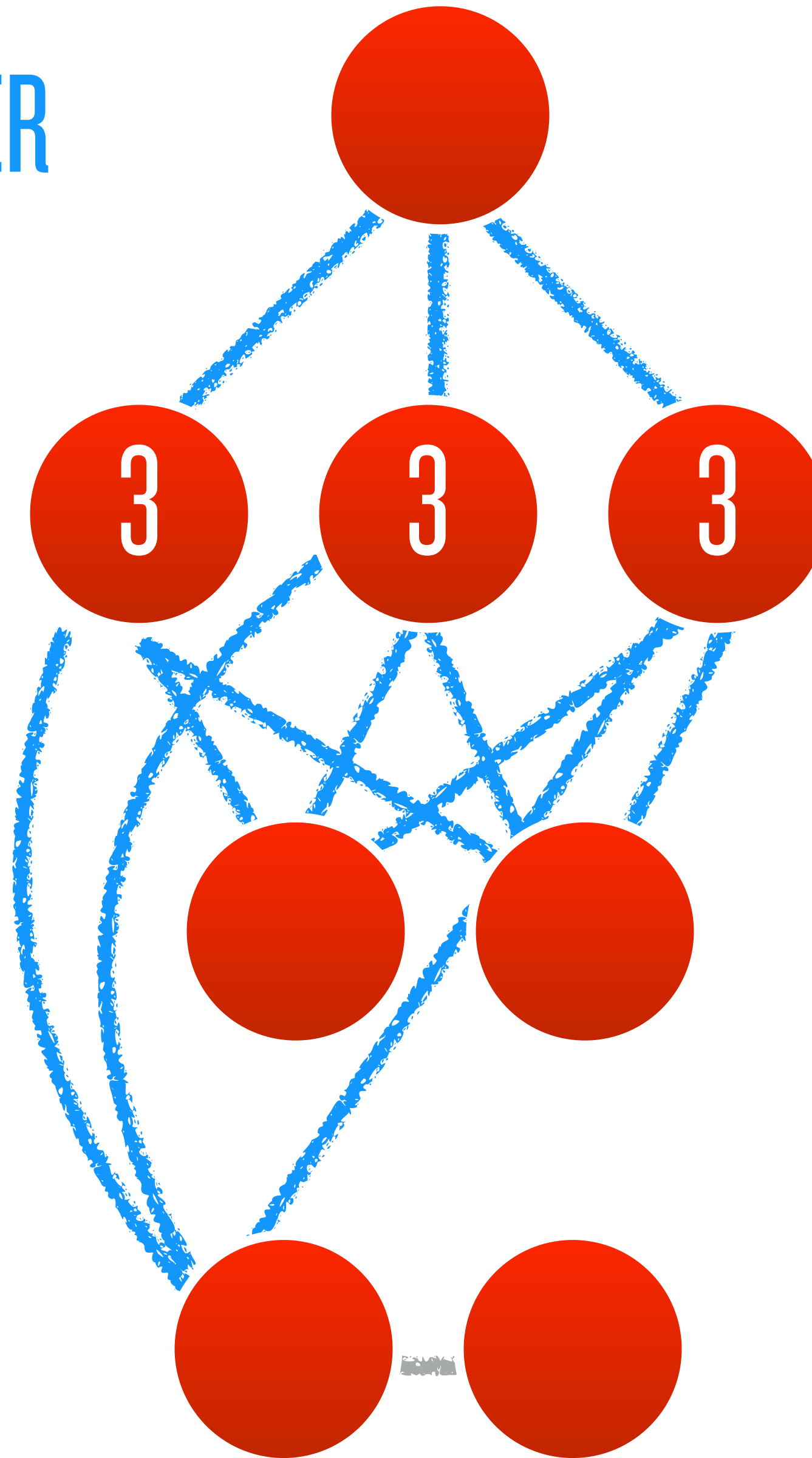


LOAD BALANCER

APPLICATION

CACHE

STORAGE





IMPERATIVE DEPLOYMENTS



CONFUSING DSL



GIT CONTROL PLANE



DECLARATIVE DEPLOYMENT MODEL

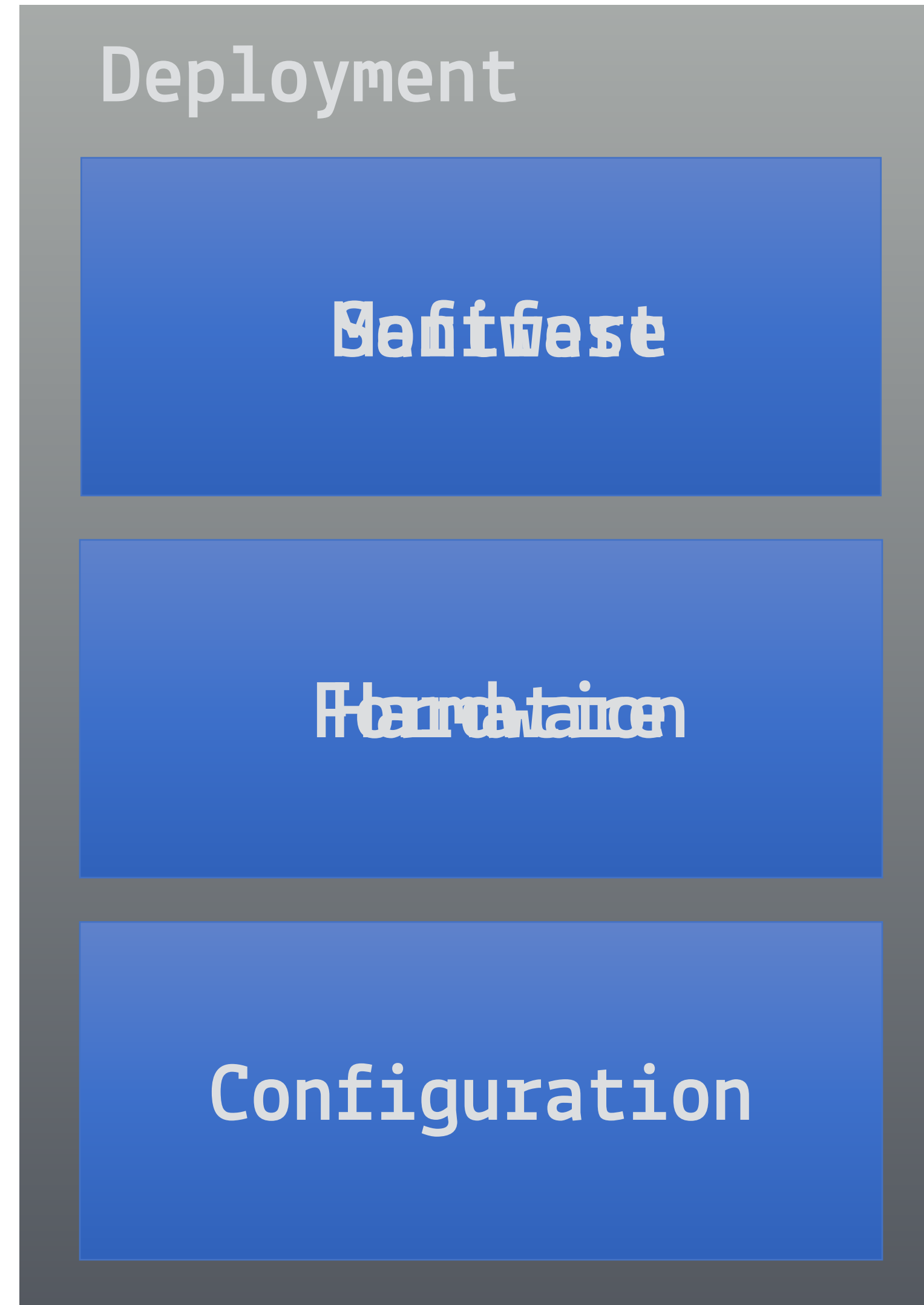


WHAT'S IN A DEPLOYMENT?





WHAT'S IN A DEPLOYMENT?





WHAT'S IN A DEPLOYMENT?





ADMIRAL PLATFORM CONSOLE





RED BLACK DEPLOYMENTS

ADMIRAL NEW MySQL Deployments Need Help? Logout

orch-test-role New Deployment

Overview
Access
Secrets
Settings
Deployments
Autoscaling
Lazarus
Rulesets

Deployments Hide Autoscale Deployments

Search...

ENVIRONMENT	DESCRIPTION	STATUS	CREATOR	CREATED
DEV	Add new canary software.	Rolled Back	jgiannakos	6 minutes ago
DEV	kill all	Deployed	rprasetya	Jun 21st 2018, 10:08 pm
DEV	MORE than one subnet per AZ	Deployed	eflannery	Jun 20th 2018, 3:27 pm
DEV	MORE than one subnet per AZ	Deployed	eflannery	Jun 20th 2018, 7:47 am
DEV	MORE than one subnet per AZ	Deployed	eflannery	Jun 19th 2018, 9:27 pm
DEV	hi	Rolled Back	jgiannakos	Jun 19th 2018, 10:18 am





100

CONTAINER MIGRATION



RPM MANIFEST



CONTAINER MANIFEST



AWS FORMATION



CONTAINER FORMATION



ZERO DOWNTIME **MYSQL DEPLOYMENTS**



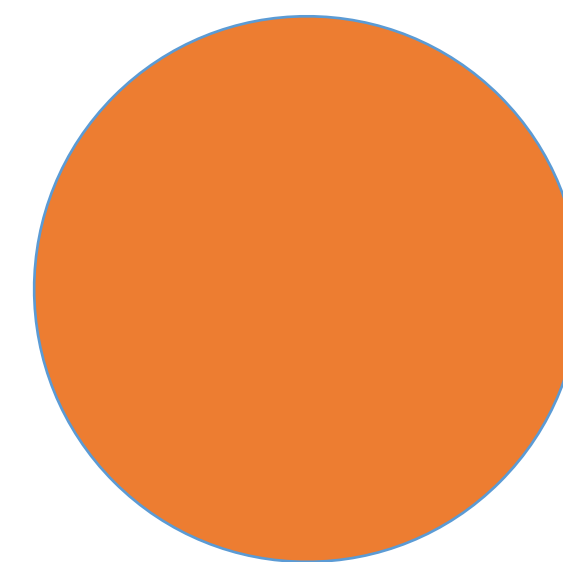
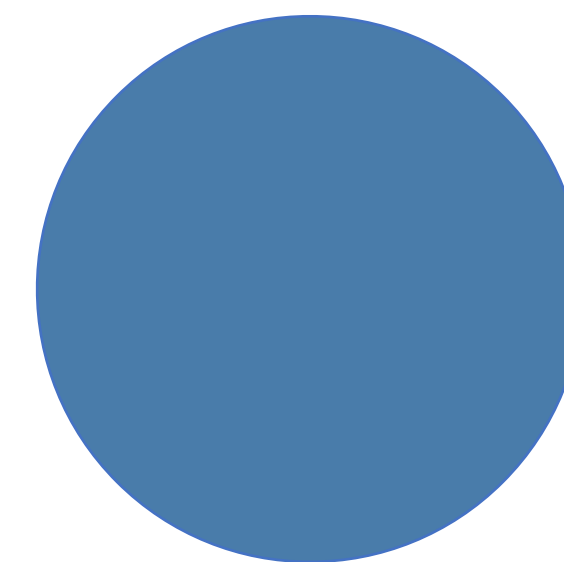
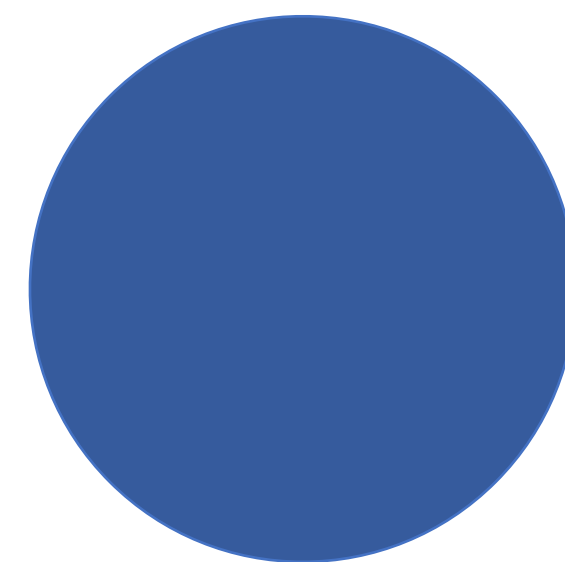
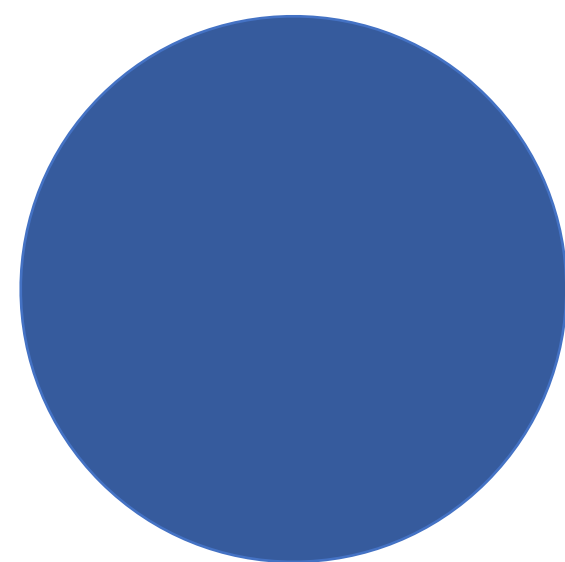
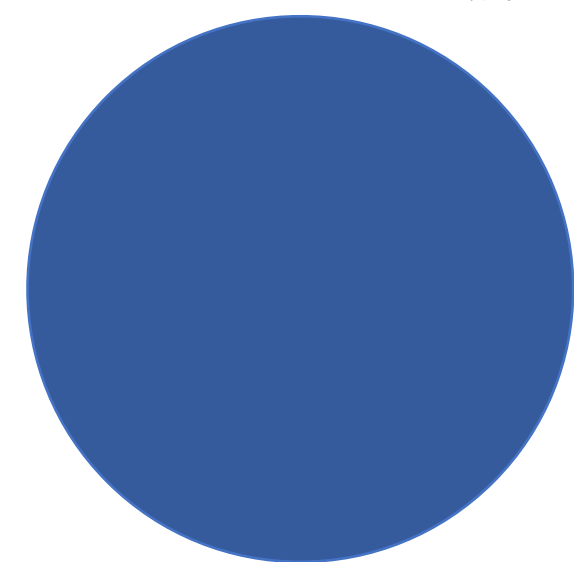
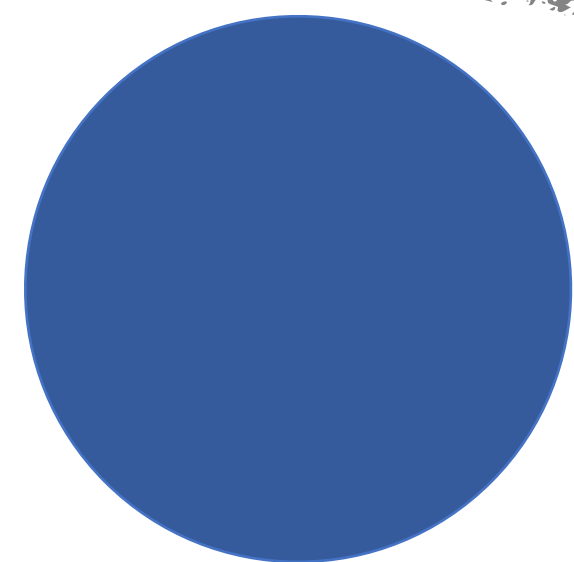
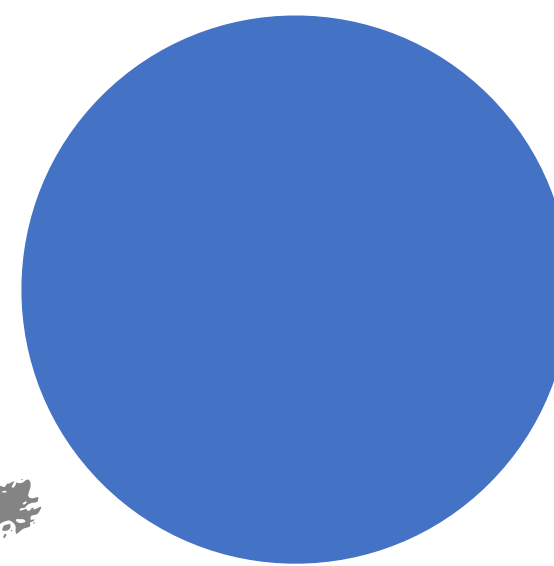
TWILIO



MYSQL



PRIMARY



REPLICAs

REPLICAs

REPLICAs

ANALYTICS

BACKUP

MONITOR





SEMI MANUAL MYSQL PIVOTS








MYSQL DEPLOYMENTS



The screenshot shows the Twilio Admiral console interface. At the top, the user is logged in as 'ADMIRAL'. The main navigation menu on the left includes options like Overview, Access, Secrets, Settings, Deployments (which is currently selected), Autoscaling, Lazarus, and Rulesets. The 'Deployments' section is expanded, showing a list of deployment resources. The resource 'mysql-twilio_orchd-master' is selected, and its details page is displayed. The main content area is currently blank, with a large loading spinner (a circle with a dot) in the center, indicating that the deployment details are still being fetched or are not yet visible.




  1 month ago
OMG... is this true? I'm gonna cry...

  1 month ago
We'll try on Friday!

  1 month ago
[@](#)  haha, its true. What database cluster should we enable for?

  1 month ago
`mysql-twilio_video0`

 1



SERVICE MESH

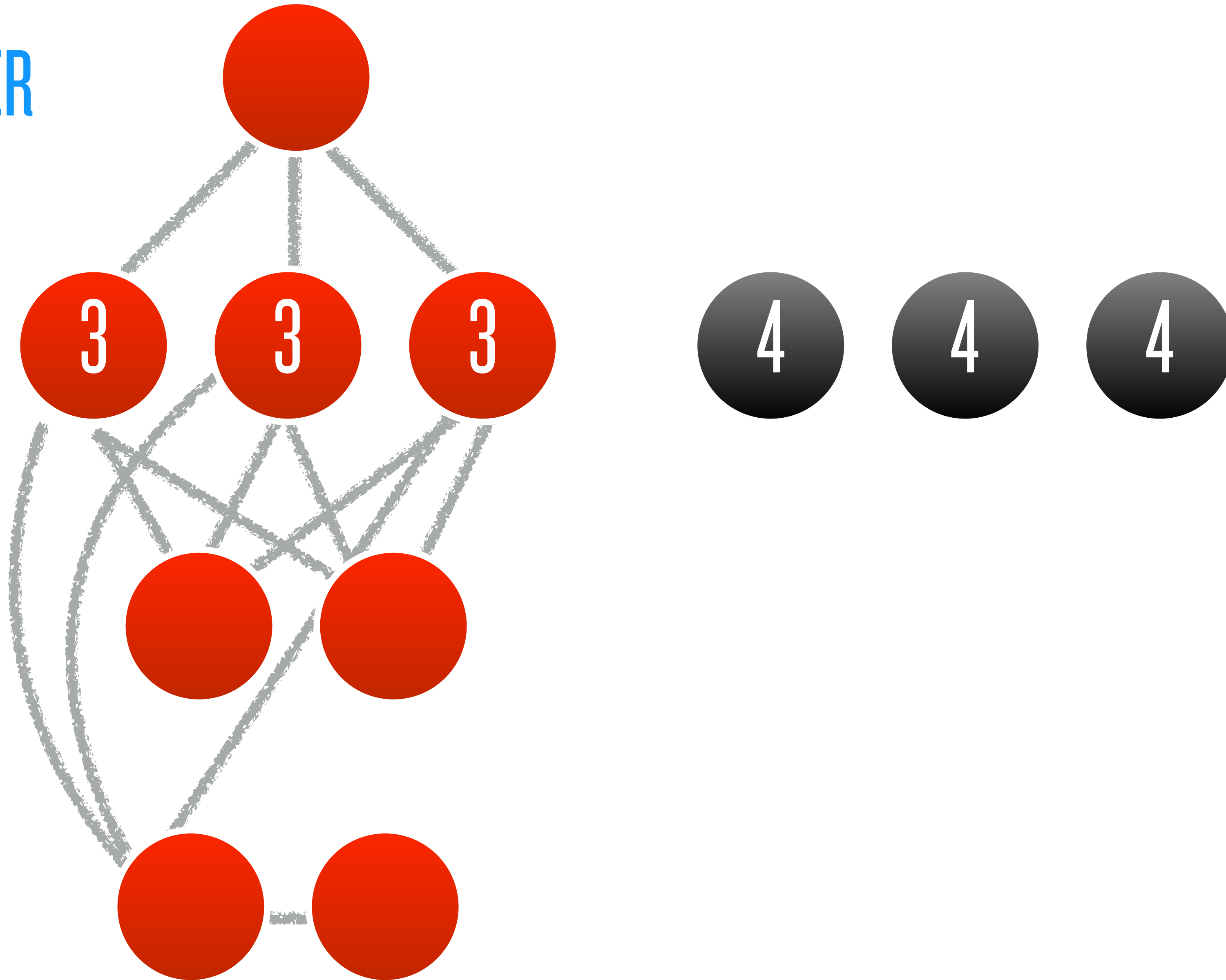


LOAD BALANCER

APPLICATION

CACHE

STORAGE



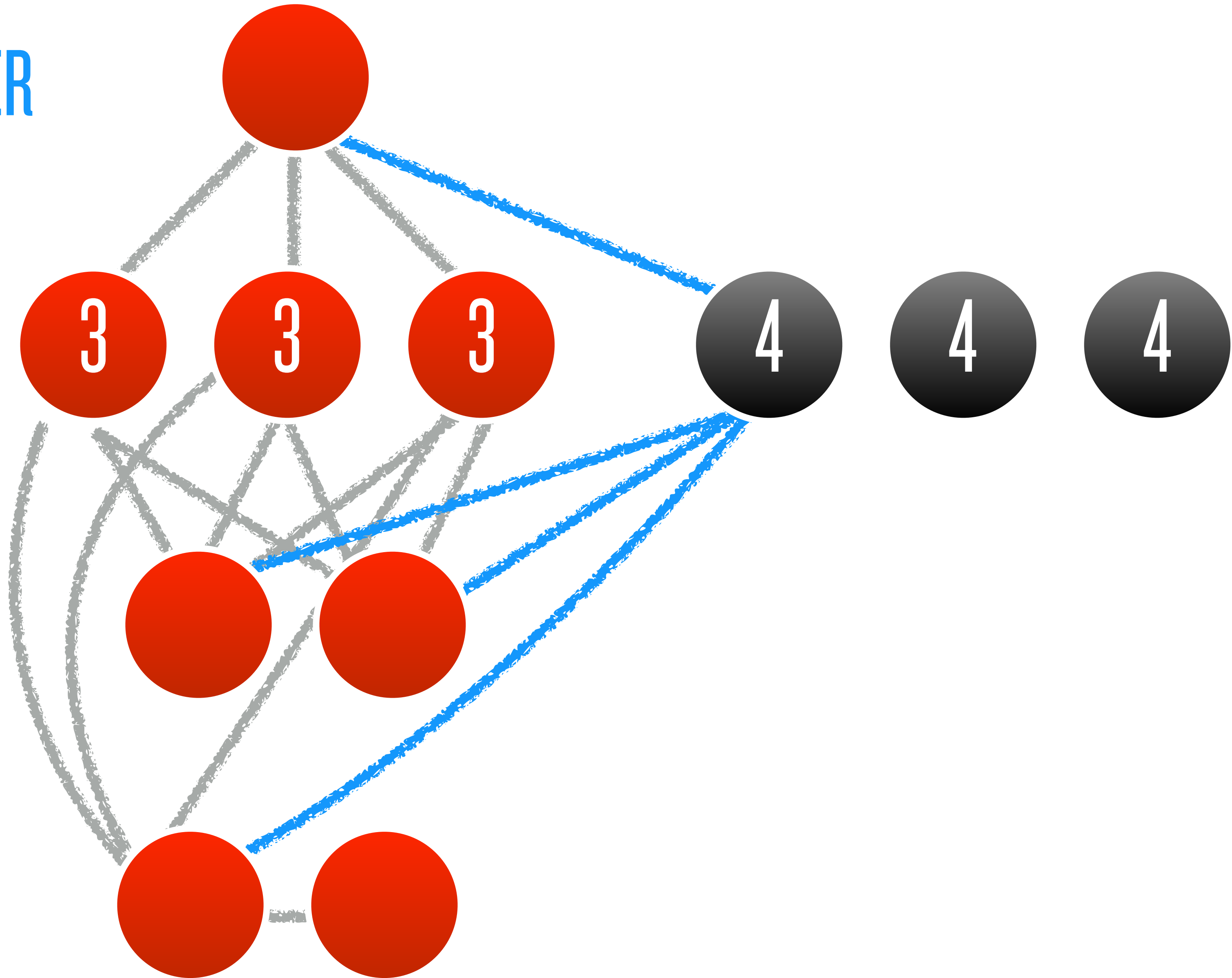


LOAD BALANCER

APPLICATION

CACHE

STORAGE



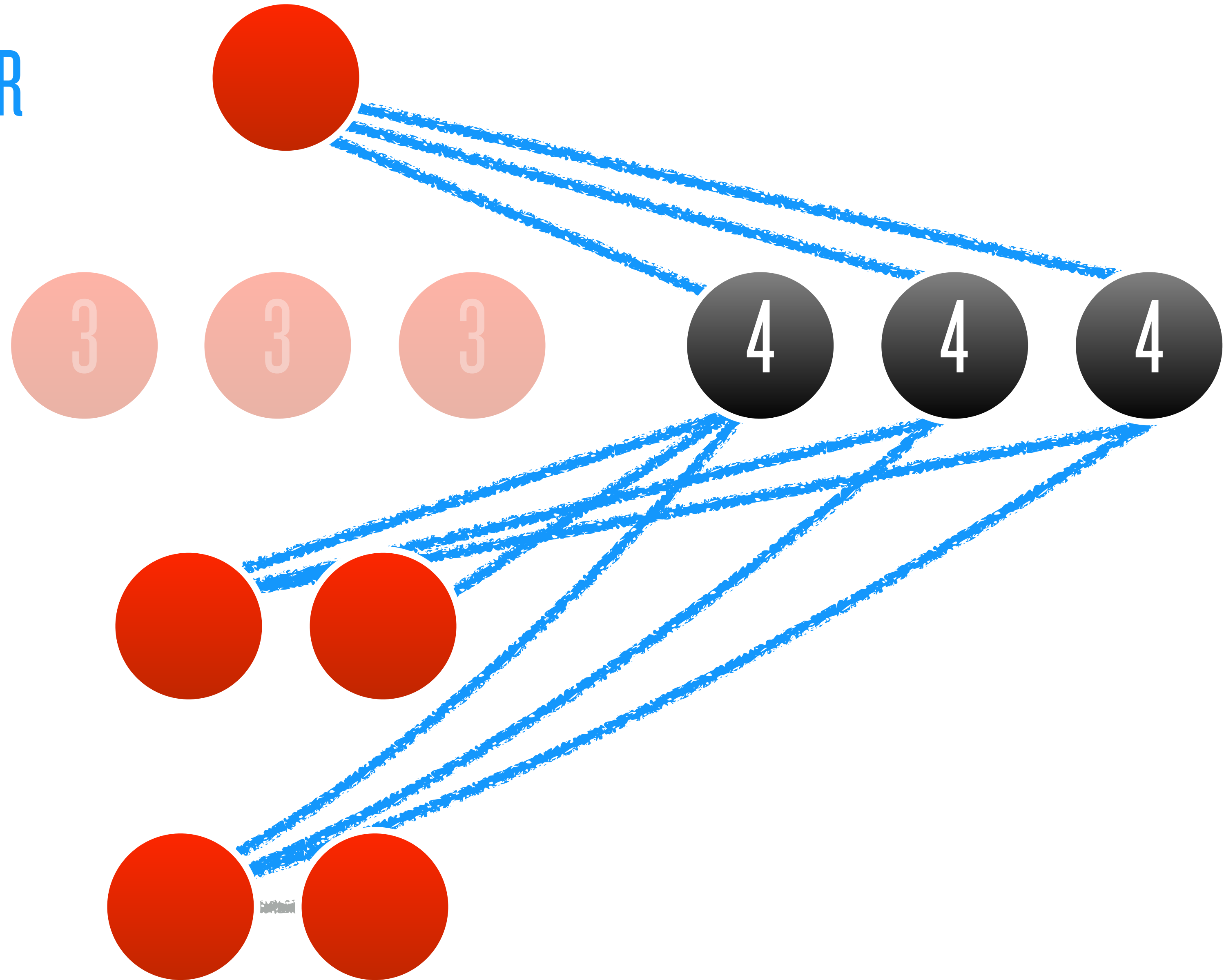


LOAD BALANCER

APPLICATION

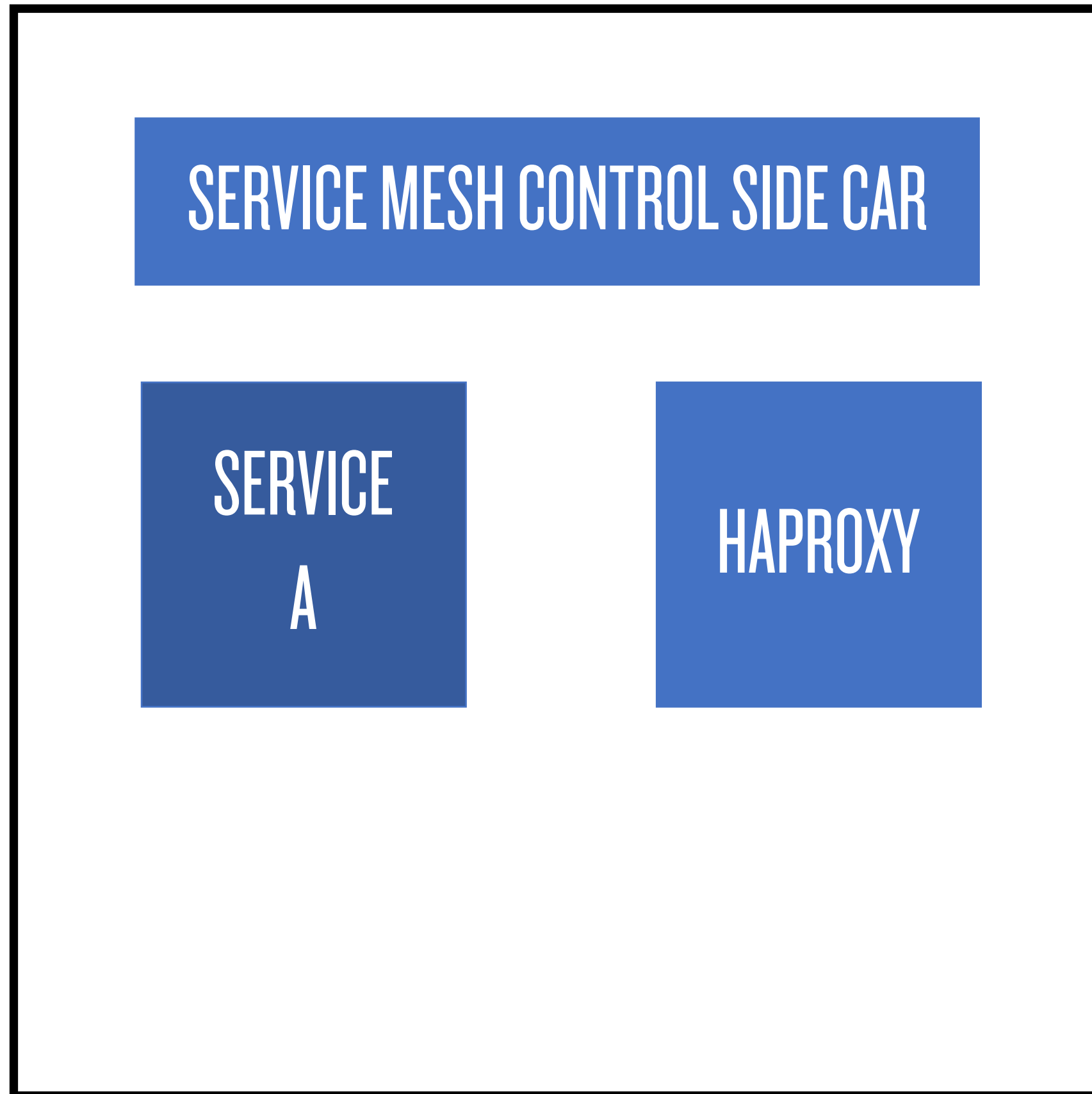
CACHE

STORAGE

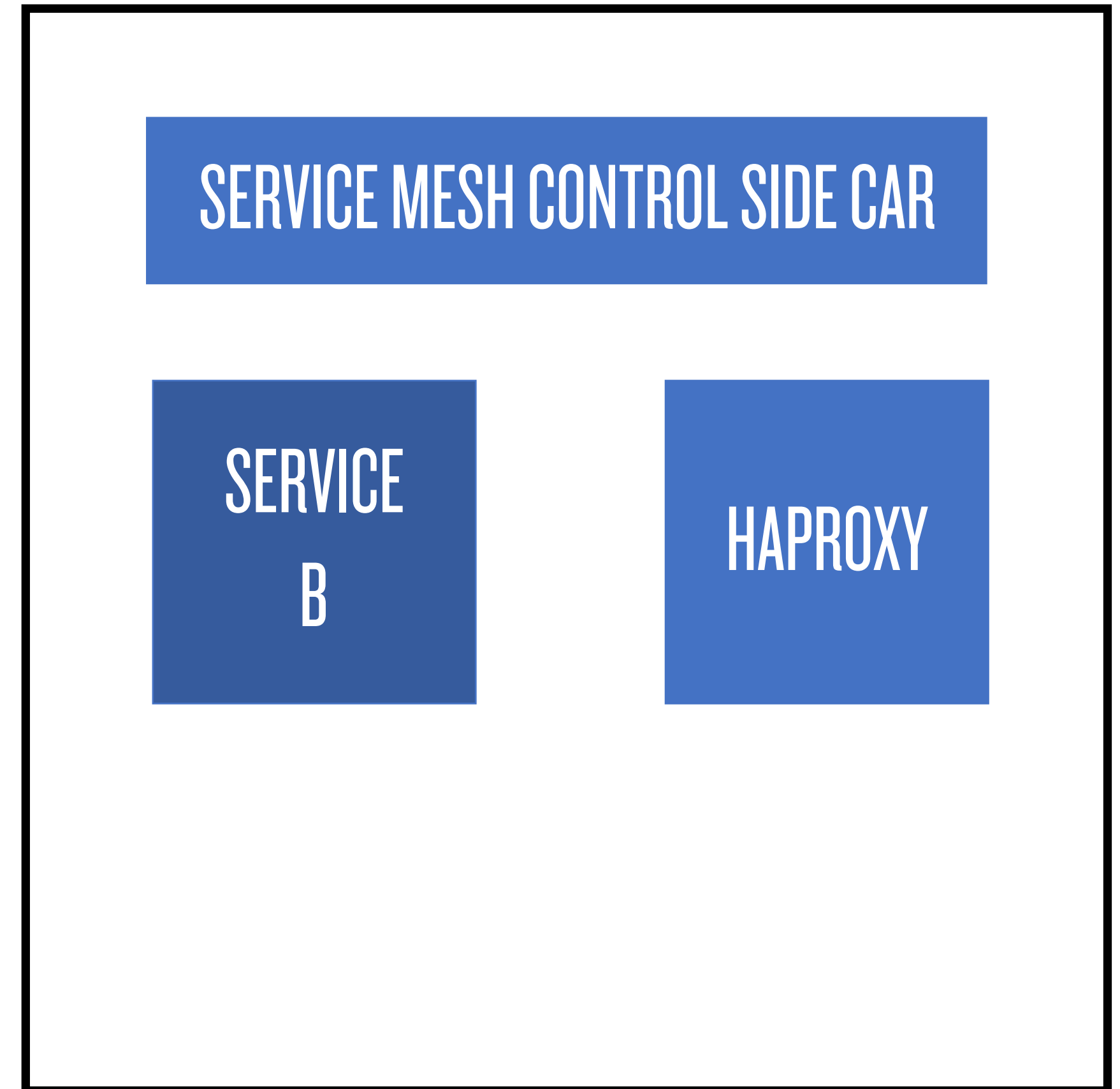




NODE A



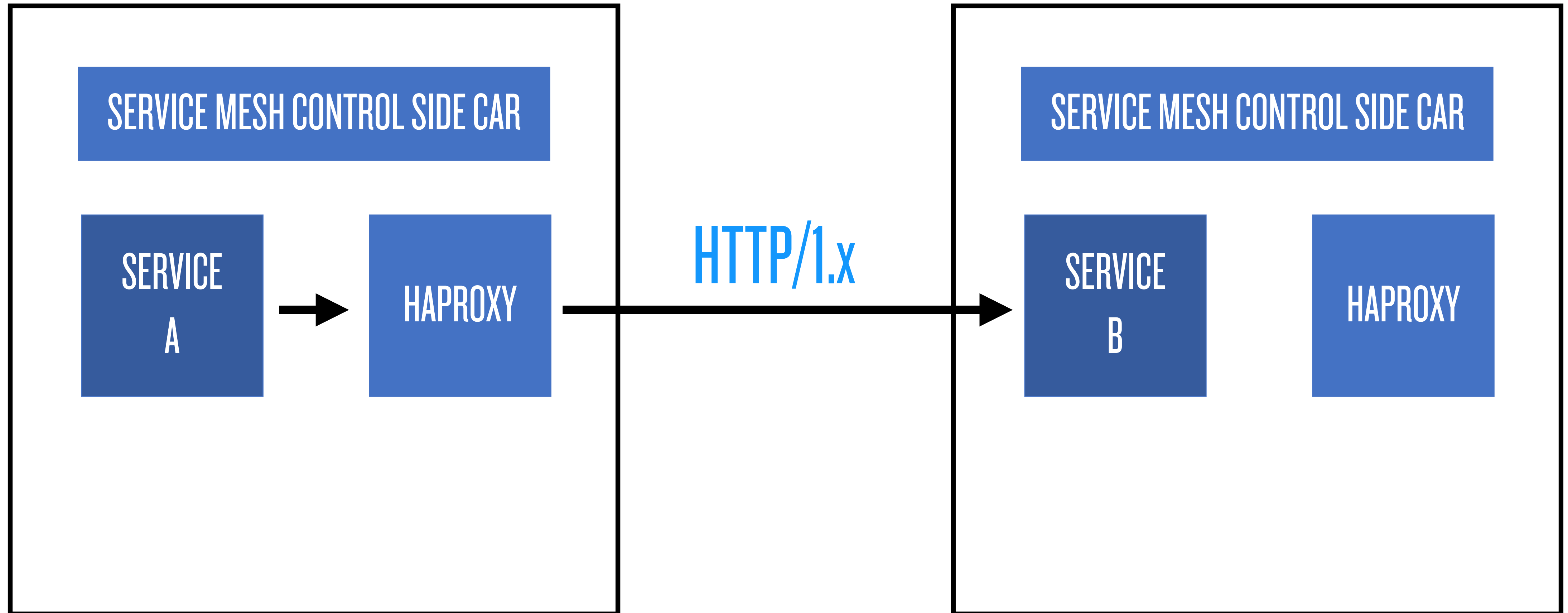
NODE B





NODE A

NODE B



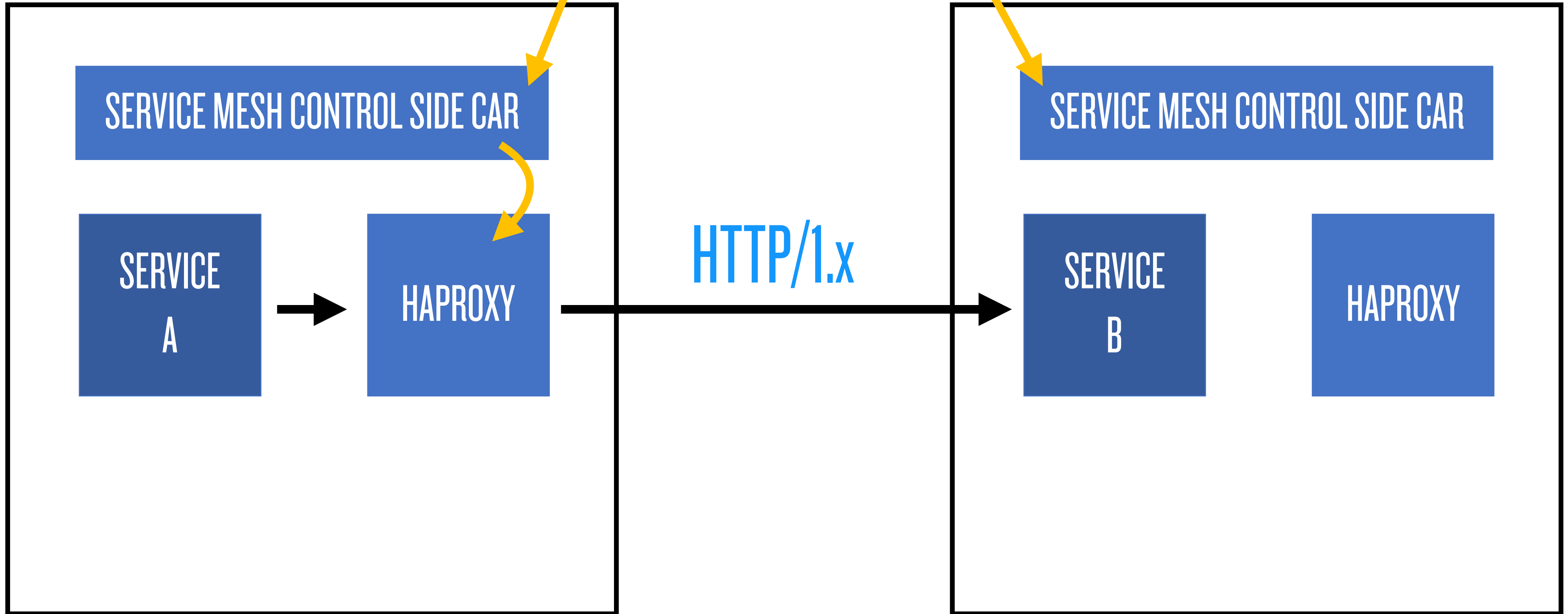


NODE A

WS

WS

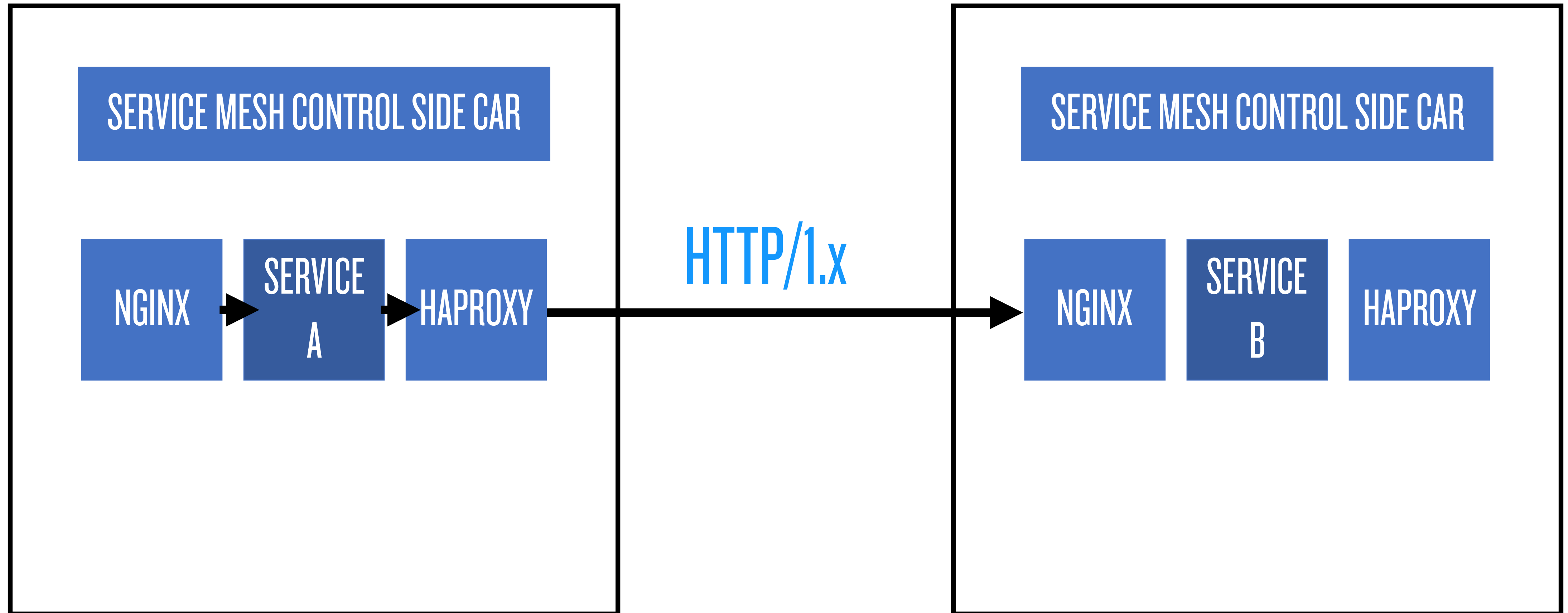
NODE B





NODE A

NODE B





CONFIGURATION BEAST



DNRV
DNRV



SERVICE MESH **UPGRADE**

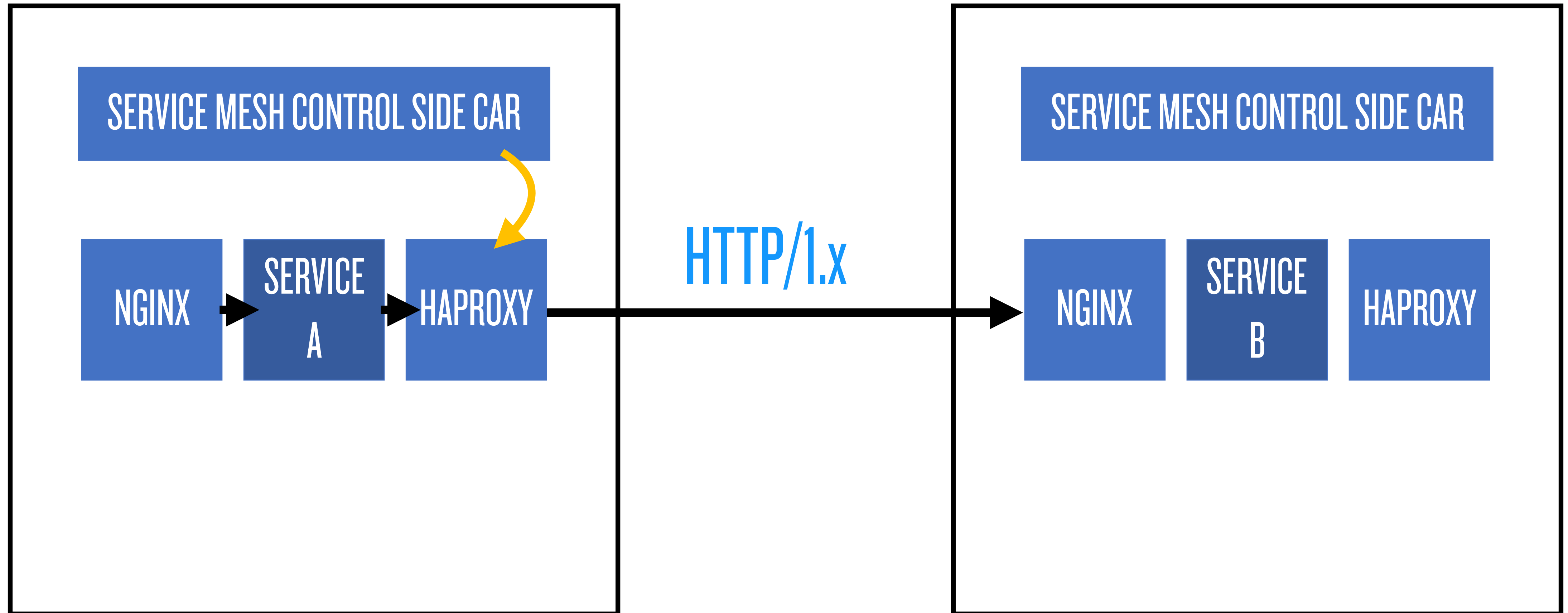


HAPROXY / NGINX  **ENVOY**



NODE A

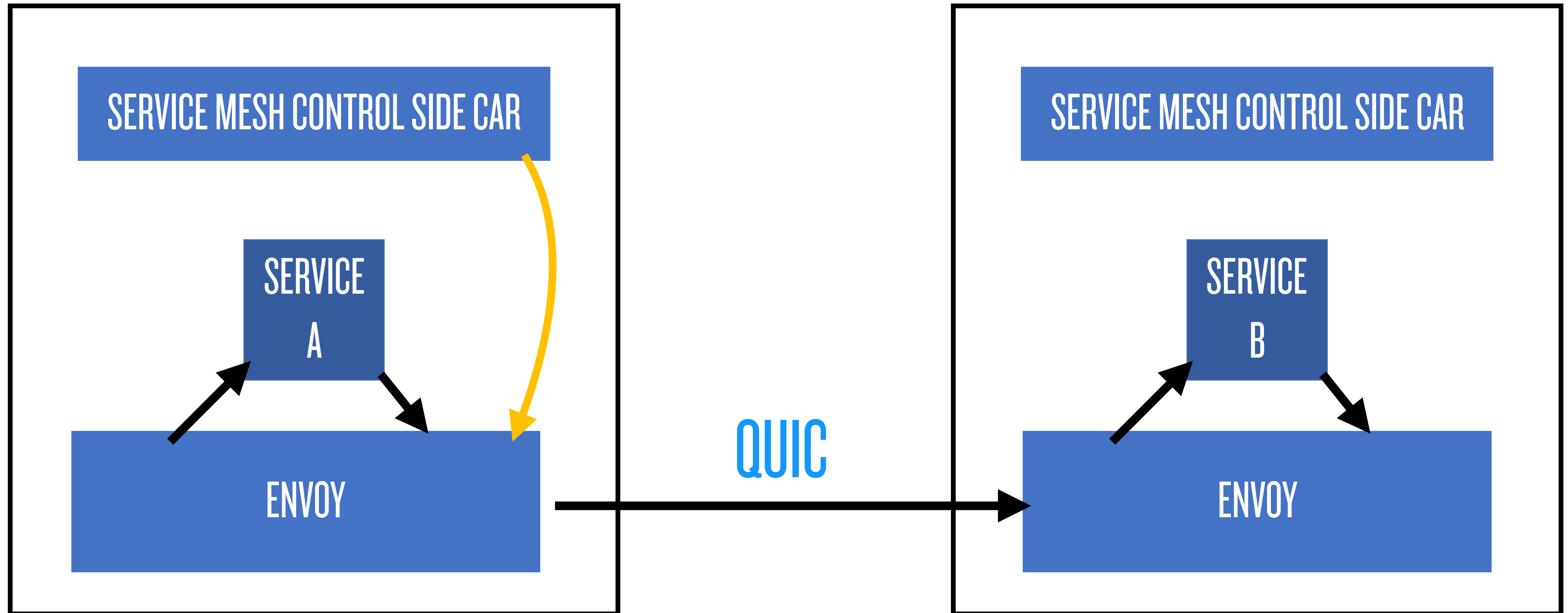
NODE B





NODE A

NODE B





DECLARATIVE SERVICE CATALOG



DNRY



AUTO MIGRATION



BUILD

WITH

EMPATHY



DRINK YOUR OWN

CHAMPAGNE!



CUSTOMER FEEDBACK



FEEDBACK

OVER

OPINION



HOSPITALITY

OVER

SERVICE



“

Hospitality is present when something happens for you. It is absent when something happens to you. Those two simple prepositions - for and to - express it all.

DANNY MEYER | UNION SQUARE HOSPITALITY GROUP





DOES YOUR PLATFORM
DO SOMETHING
FOR OR TO
YOUR USERS?









NET PROMOTER



AGREE OR DISAGREE

BUILD

I can effectively build my software.

I have the tools to validate my software.

DELIVER

I can reliably deliver my software to dev, stage, and prod.

I can efficiently manage my cloud infrastructure.

RUN

I can measure the operational metrics of my services.

I understand the cost of running my service.

COMPELLING

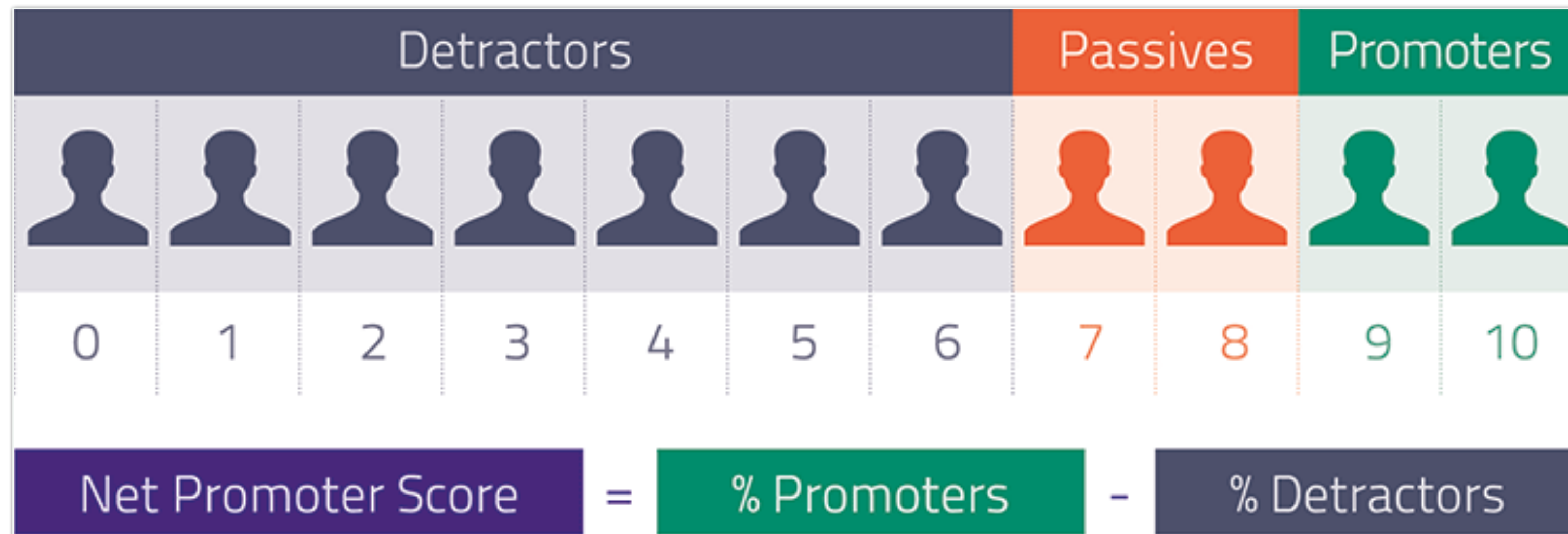
I feel platform tools are consistently improving.

I can voice problems that result in improvements.

My tools are best in class.



-100 TO 100 SCALE

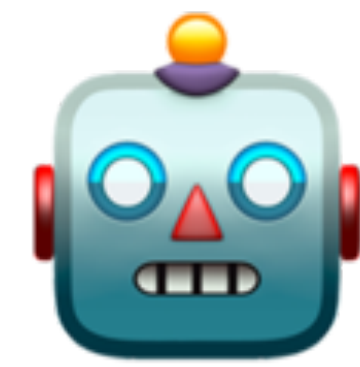




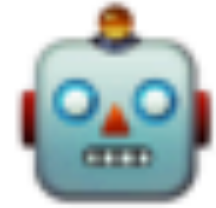
-59



20



SLACK NPS BOT



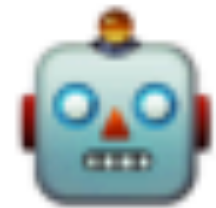
platform-eng-bot APP 1:10 PM

How would you rate your experience deploying with Admiral?
Give me a whole number from **0** (*really bad*) to **10** (*really good*)



1:10 PM

8



platform-eng-bot APP 1:10 PM

Thank you for your response!

Any other comments?



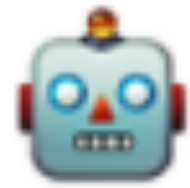
1:10 PM

Works great, would like to see a deployment strategy for my zookeeper cluster.



platform-eng-bot APP 1:11 PM

Thank you!



platform-eng-bot APP 11:28 AM

gave admiral deploy a score of 6

wrote in a longer deploy, lets say 30-40 node, it will be nice to see how much was completed, kind of like a progress bar





THANK YOU



API FIRST



SELF-SERVICE

OVER

GATEKEEPERS



DECLARATIVE

OVER

IMPERATIVE



BUILD

WITH

EMPATHY





ONWARD

WE ARE HIRING!



jkitagawa@twilio.com



[@JustinMKitagawa](https://twitter.com/JustinMKitagawa)