29th July 2019

Jonathan Relf

DEVEL-OPS

Commify

Commify is the team behind a global portfolio of business messaging brands. We work with more than 45,000 companies, helping them transform their mobile communications with their customers and staff.

esendex. Mobyt smspubli trendoo skebby cloud sms solutions textmarketer

Massenversand.de SMSenvoi SMS UP fastsms textanywhere mediaburst

Commify

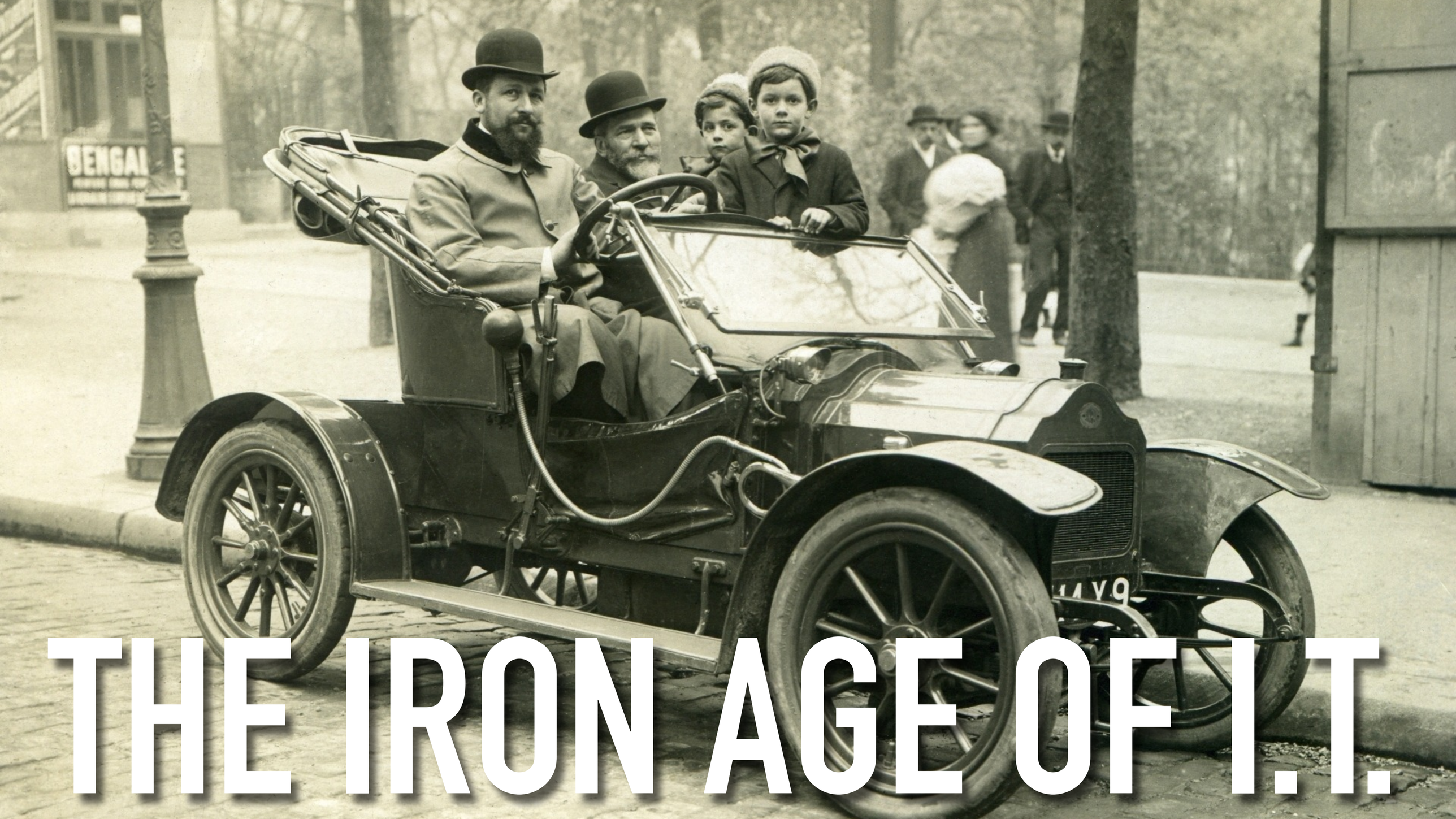
WHAT WE DO

We provide SMS, voice, web, IP/OTT, email and intelligent multichannel messaging services both on a self-serve basis (through an online platform or API), and as tailored solutions to more complex needs.

www.commify.com

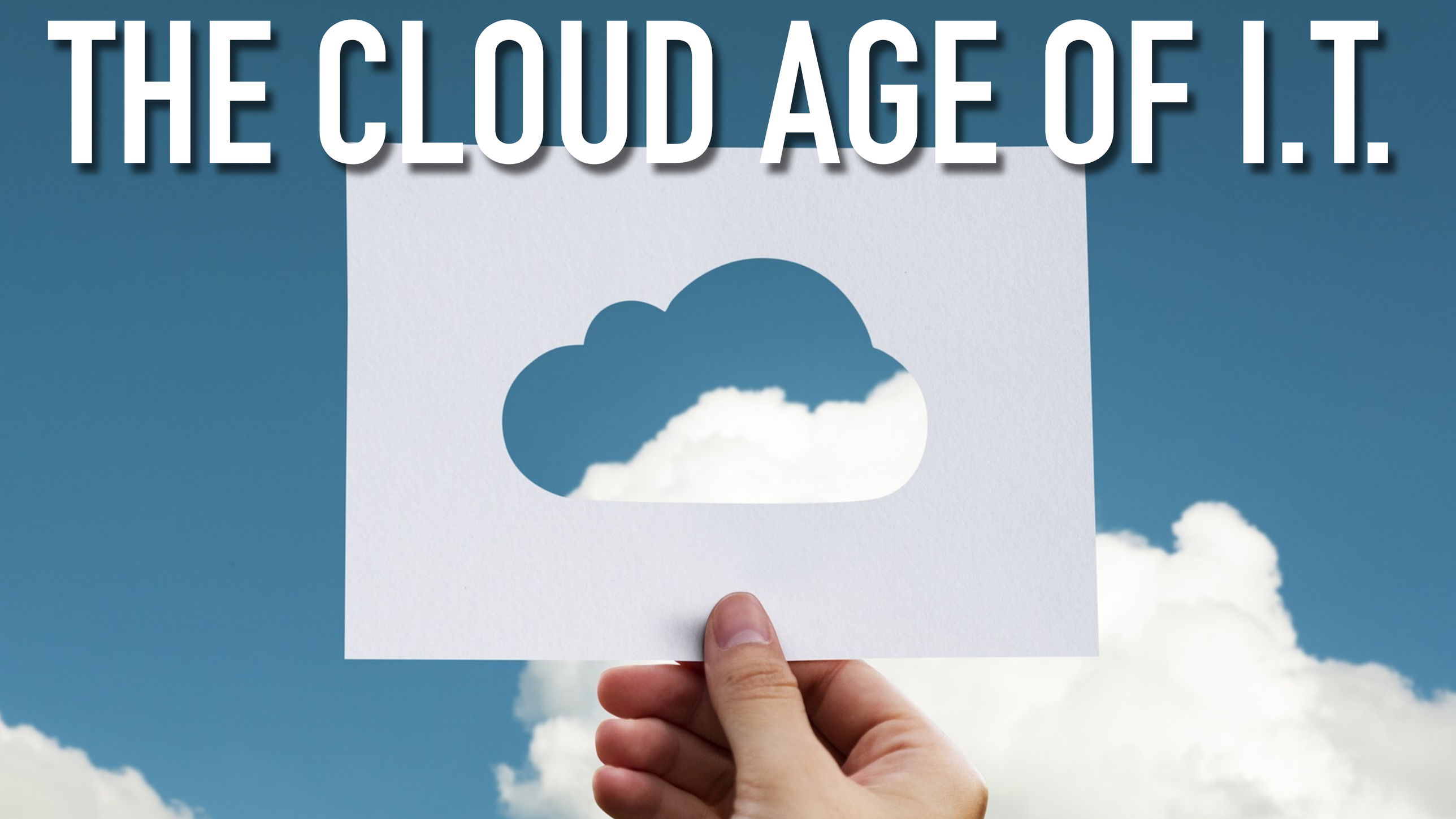
BRINGING DEVELOPMENT PRACTICES
TO OPERATIONS TASKS

DEVEL-OPS



THE IRON AGE OF I.T.

THE CLOUD AGE OF I.T.

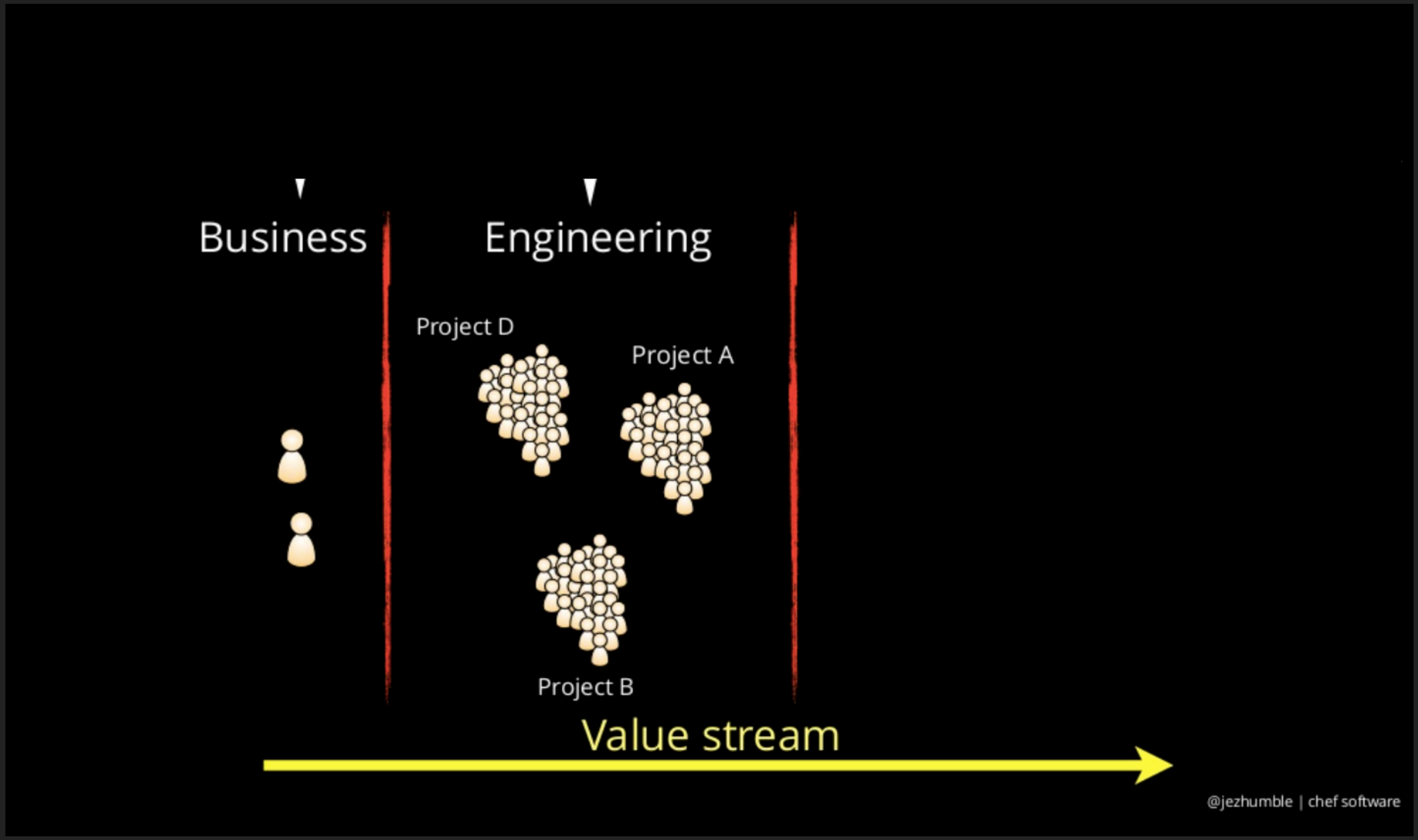


Infrastructure As Code

"UNRELIABLE SOFTWARE
DEPENDING ON RELIABLE HARDWARE TO
RELIABLE SOFTWARE
RUNNING ON UNRELIABLE HARDWARE"

Infrastructure As Code

https://www.slideshare.net/bgracely/enterprise-devops-emc-world-2015-jez-humble-spotlight-session



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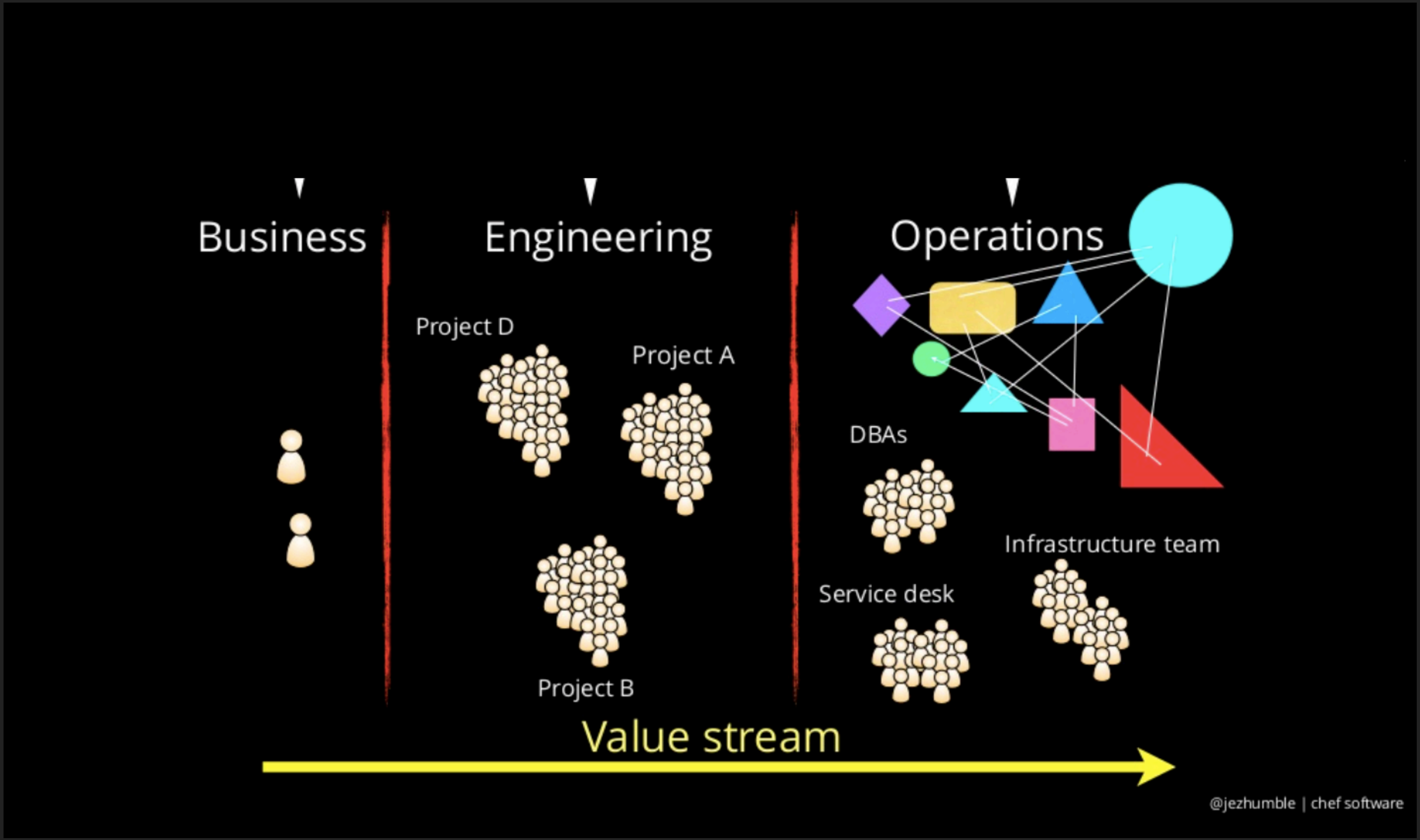

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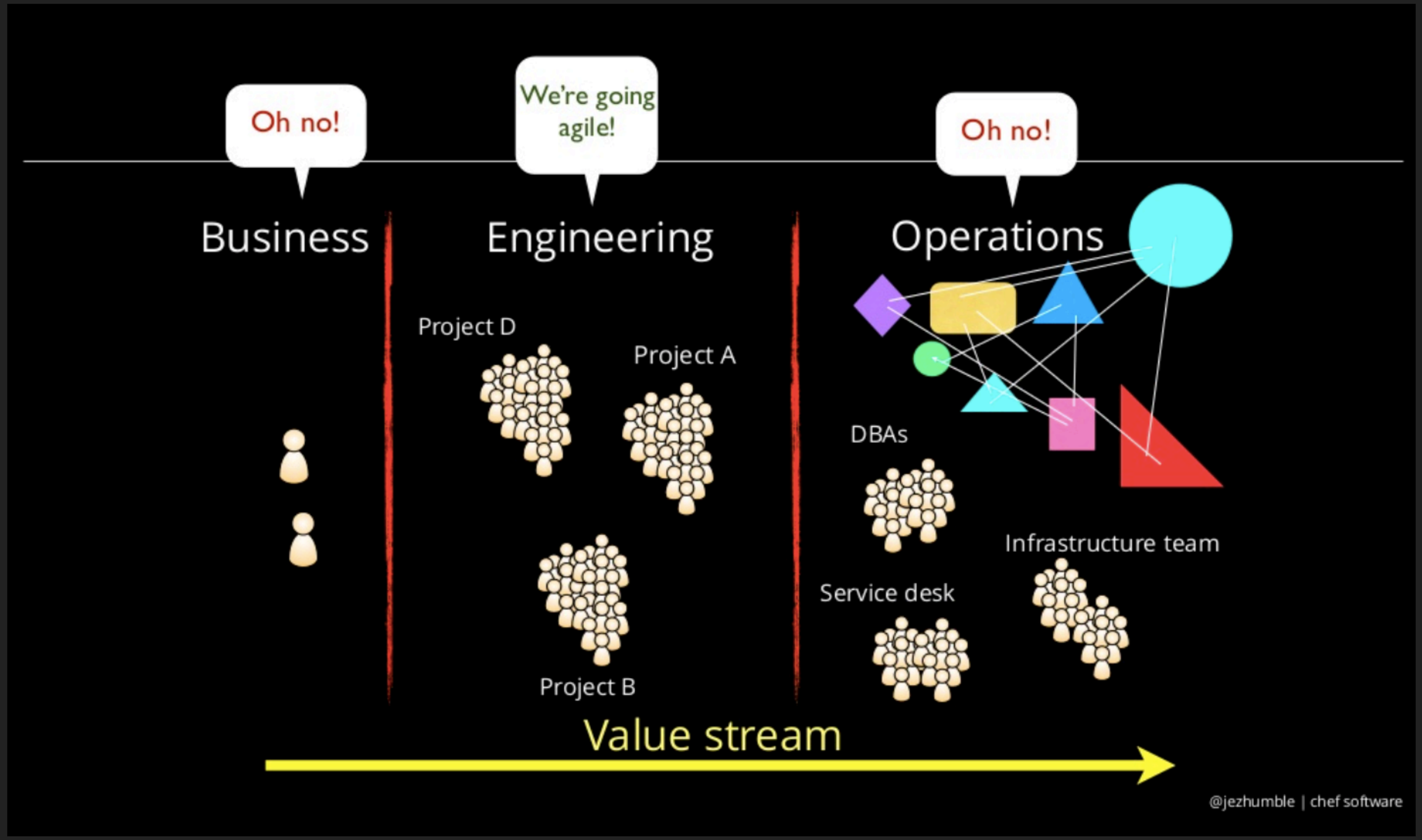


https://www.slideshare.net/bgracely/enterprise-devops-emc-world-2015-jez-humble-spotlight-session

Martin Fowler, DevOpsCulture, 2015

"ONE COMMON ANTI-PATTERN WHEN INTRODUCING DEVOPS TO AN ORGANIZATION IS TO ASSIGN SOMEONE THE ROLE OF 'DEVOPS' OR TO CALL A TEAM A 'DEVOPS TEAM'. DOING SO PERPETUATES THE KINDS OF SILOS THAT DEVOPS AIMS TO BREAK DOWN…"

Martin Fowler, DevOpsCulture, 2015


OVER LOOK

DEVOPS SHOULD NOT BE

VS

Devs

Ops


abc


CAUTION

DEVOPS SHOULD BE MORE:

Jez Humble

@jbjon

DEVOPS IS "A CROSS-DISCIPLINARY COMMUNITY OF PRACTICE DEDICATED TO THE STUDY OF BUILDING, EVOLVING AND OPERATING RAPIDLY-CHANGING RESILIENT SYSTEMS AT SCALE."

Jez Humble

@jbjon


老北京布鞋
老北京布鞋
古文化
古董字

Unknown

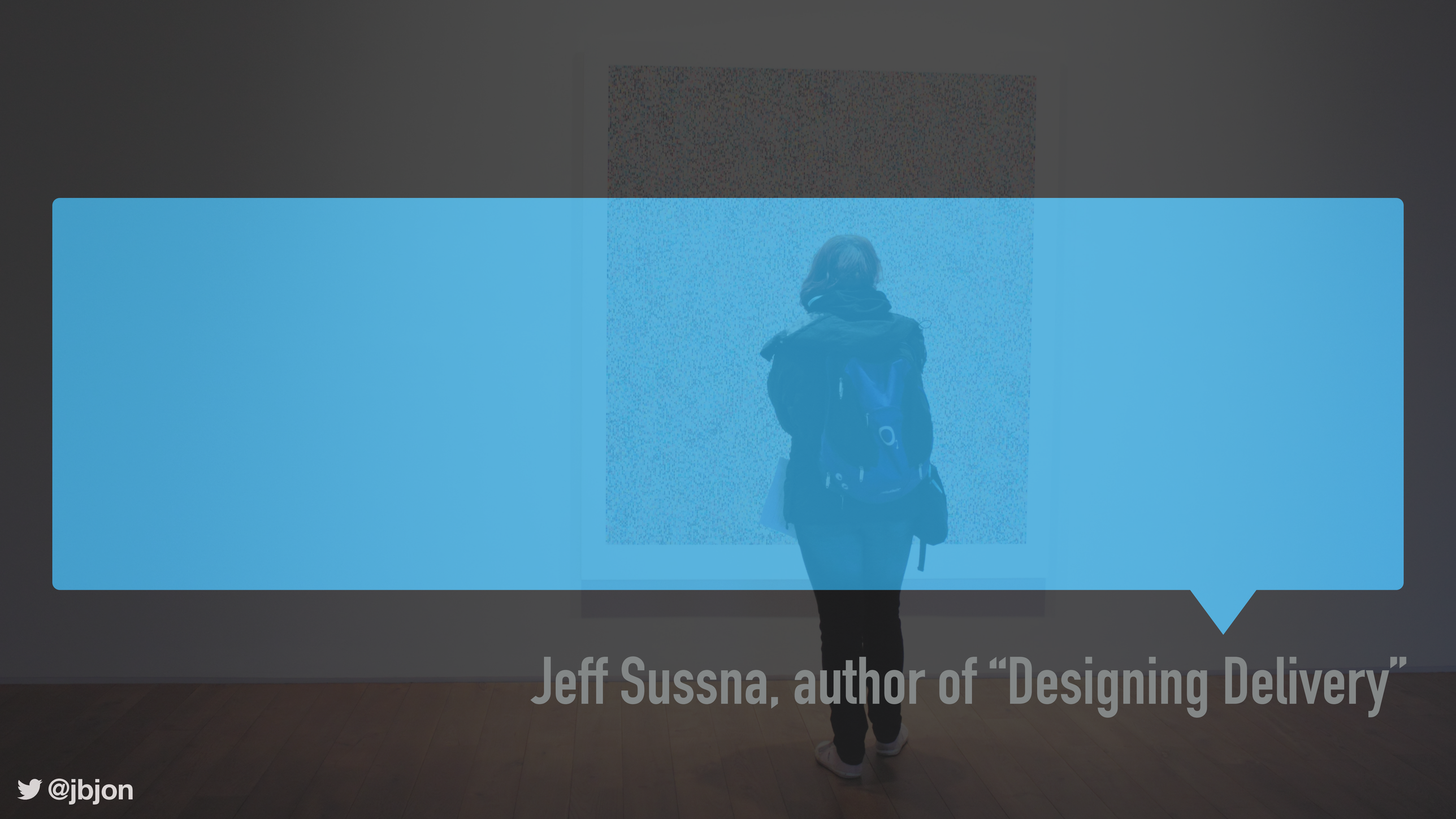
"THE DEFINITION OF INSANITY
IS REPEATING THE SAME MISTAKES
OVER AND OVER AGAIN
AND EXPECTING DIFFERENT RESULTS"

Unknown

Jonathan Relf

"THE DEFINITION OF INSANITY IN I.T. OPERATIONS
IS MANUALLY REPEATING A TASK
OVER AND OVER AGAIN
AND EXPECTING THE SAME RESULTS"

Jonathan Relf


Jeff Sussna, author of “Designing Delivery”
@jbjon

"DEVOPS HAS BECOME MORE ABOUT THOSE DETAILS (CONTAINERS, SERVERLESS, SRE, OBSERVABILITY, ETC.) AND LESS ABOUT THE BIG PICTURE. AND, TO SOME DEGREE THE CULTURAL ASPECTS OF DEVOPS HAVE TAKEN A BACK SEAT TO A FOCUS ON FAST LINEAR DELIVERY.
THIS PENDULUM WILL NEED TO SWING BACK AT SOME POINT."

Jeff Sussna, author of "Designing Delivery"

App Definition & Development

Database & Data Warehouse

BIGCHAIN DB, CarbonData, cassandra, Cockroach DB, Couchbase, CRATE.IO, IBM DB2, druid, FoundationDB, MariaDB, mongoDB, MySQL, noms, ORACLE DATABASE, Pachyderm, PostgreSQL, Qubole, redis, RethinkDB, Spark, SQL Data Warehouse, SQL Server, snowflake, TiDB, VERTICA, VITESSE DATA

Streaming

amazon Kinesis, APEX, Dataflow, Flink, HERON, iguazio, kafka, NATS, RabbitMQ, STORM, StreamSets

SCM

Bitbucket, GitHub, GitLab

Registry Services

ATOMIC, Azure Registry, Amazon ECR, Google Registry, HARBOR, JFrog Artifactory, QUAY, Registry, Sonatype

Application Definition

apache brooklyn, bitnami, hobitat, OPEN API, Packer

Orchestration & Management

Scheduling & Orchestration

kubernetes (CNCF Project), AMAZON ECS, MESOS, Nomad, SWARM

Coordination & Service Discovery

CoreDNS (CNCF Project), Apache ZooKeeper, CONSUL, etcd, NETFLIX OSS Eureka, Hyperbahn, Registrator, SkyDNS, SmartStack, vmware Haret

Service Management

linkerd (CNCF Project), GRPC (CNCF Project), Apache Thrift, AVI Networks, AVRO, backplane, DATAWIRE, envoy, f5, weaveflux, HAPROXY, HYSTRIX, KONG, Istio, NGINX, NETFLIX Ribbon, TURBINE LABS, traefik, vamp, NETFLIX Zuul

Runtime

Cloud-Native Storage

ceph, CONTAINER NATIVE STORAGE, DATERA, DELL EMC, Diamanti, FlashStack, GlusterFS, HEDVIG, infinit, libStorage, MINIO, NetApp, openSDS, portworx, Quobyte, Sheepdog, REX-Ray, ROBIN, ROOK, springpath, STORAGEOS

Container Runtime

containerd (CNCF Project), rkt (CNCF Project), OPEN, cri-o, lxd

Cloud-Native Network

CNI (CNCF Project), Aporeto, AVIATRIX, big switch, CALICO, canal, Contiv, CUMULUS, flannel, midokura, vmware NSX, OPENCONTRAIL, OvS Open vSwitch, PLUMgrid, ROMANA, snaproute, TIGERA, weave net

Provisioning

Bare Metal

DIGITAL REBAR, FOREMAN, MAAS, openstack, Scaleway, vmware

Infr. Automation

BOSH, CloudFormation, Cloudify, coreo, HELM, INFRAKIT, juju, Terraform

Host Management / Tooling

ANSIBLE, CFEngine, CHEF, puppet, RUN DECK, SALTSTACK

CI/CD

AppVeyor, Bamboo, buddybuild, Buildkite, circleci, CloudBees, codefresh, CODESHIP, Concourse, Container Cps, distelli, DRONE, GitLab Runner, Jenkins, semaphore, shippable, Solano Labs, Spinnaker, TeamCity, Travis, wercker

CI/CD Security

aqua, anchore, clair, NeuVector, notary, Twistlock, HashiCorp Vault

Public Cloud

amazon web services, Microsoft Azure, Google Cloud Platform, IBM Bluemix, Alibaba Cloud aliyun.com, ORACLE CLOUD, DigitalOcean, FUJITSU, HUAWEI, Joyent, packet, Tencent Cloud

Platforms

PaaS / Container Service

AWMIC, APCERA, apprenda, EMC Bluemix, CLOUD 66, CLOUD FOUNDRY, GALACTIC FOG, container linux, ContainerShip, CONVOX, DATAWIRE, DC/OS, DEIS workflow, docker, exoscale, Flynn, Giant Swarm, GRAVITATIONAL, heroku, hyper_, Iron.io, Jelastic, KONTENA, Lightbend, MANTL, moby project, navops, nirmata, OPENSHIFT, PaaSTA, PHOTON, PLATFORM9, RANCHER, remind, STACKPOINT CLOUD, TECTONIC, TRITON, tsuru, ubuntu

Serverless/Event-based

APEX, Azure Functions, Cloud Functions, Firebase, fission, Kubeless, AWS Lambda, NStack, OpenWhisk, ORACLE Fn Project, PubNub BLOCKS, SERVER LESS, webtask

Observability & Analysis

Monitoring

Prometheus (CNCF Project), APPDYNAMICS, AppNeta, Azure Log Analytics, catchpoint, centreon, AWS CloudWatch, COBE, COSCALE, DATADOG, dynatrace, Grafana, graphite, influxdb, INSTANA, Librato, LIGHTSTEP, meros, Nagios, NETSIL, New Relic, NODESOURCE, opscality, opbeat, Outlyer, OPENTSDB, RIEMANN, rocana, server density, signal fx, StackDriver, StatsDB, sysdig, WAVEFRONT, weaveworks, ZABBIX

Logging

fluentd (CNCF Project), elastic, graylog, loggly, logz.io, Loom Systems, papertrail, splunk>, sumologic

Tracing

OPENTRACING (CNCF Project), Appdash, Cloud Sleuth, JAEGER, ZIPKIN

Cloud Native Landscape

v0.9.6

github.com/cncf/landscape

This landscape is intended as a [illegible] through the previously uncharted terrain of cloud native technologies. There are many paths to deploying a cloud native application, [illegible] CNCF projects representing a particularly well-traveled path.

CLOUD NATIVE COMPUTING FOUNDATION

Red[illegible]t

Am[illegible]

2017

Greyed logos are not open source

Cloud Native Landscape
2018-10-07T18:46:36Z 0622dde

See the interactive landscape at l.cncf.io

Greyed logos are not open source

App Definition and Development

Database
Vitess (CNCF Incubating)
KV (Cloud Native Sandbox)
Ignite, ArangoDB, BIGCHAINDB, CarbonData, cassandra, Cockroach Labs, Couchbase, CRATE.IO, druid, FoundationDB, Freebase, hazelcast IMDG, IBM DB2, Iguazio, Infinispan, MariaDB, MEMSQL, SQL Server, mongoDB, MySQL, neo4j, noms, ORACLE DATABASE, OrientDB, PERCONA, pilosa, PostgreSQL, presto, Qubole, redis, RethinkDB, SCYLLA, snowflake, software AG, STABELIFIST DATA, STOLON, TiDB, VERTICA, YugaByte

Streaming & Messaging
NATS (CNCF Incubating)
cloudevents (Cloud Native Sandbox)
Amazon Kinesis, APEX, HERON, nifi, Apache RocketMQ, Apache Spark, STORM, beam, Flink, Google Cloud Dataflow, kafka, OpenMessaging, Pachyderm, PULSAR, RabbitMQ, StreamSets, talend

Application Definition & Image Build
HELM (CNCF Incubating)
Buildpacks.io (Cloud Native Sandbox)
TELEPRESENCE (Cloud Native Sandbox)
apache brooklyn, bitnami, CNAB, DRAFT, habitat, Kaniko, ksonnet, KubeVirt, minikube, On-Prem オンプレム, OPENWHISK DOCKER API, OPENAPI INITIATIVE, Packer, ServiceComb, SKAFFOLD, YIPEE.IO

Continuous Integration & Delivery
AppVeyor, argo, Bamboo, BRIGADE, Buildkite, circleci, Skycap, cloudbees, codefresh, CODESHIP, Concourse, ContainerOps, DeployHub, Drone, GITKUBE, GitLab, go, Google Cloud Build, Habitus, Jenkins, JenkinsX, Octopus Deploy, Semaphore, shippable, Spinnaker, TeamCity, Travis CI, HYSCALE Bionic Beaver, weave flux, wercker, DEPLOY, ZUUL

Orchestration & Management

Scheduling & Orchestration
kubernetes (CNCF Graduated)
Amazon ECS, Azure Service Fabric, SWARM, MESOS, Nomad

Coordination & Service Discovery
CoreDNS (CNCF Incubating)
Apache ZooKeeper, Consul, etcd, NETFLIX EUREKA

Remote Procedure Call
GRPC (CNCF Incubating)
Apache Thrift, WCF, DUBBO

Service Proxy
envoy (CNCF Incubating)
AVI Networks, backplane, f5, HAPROXY, heptio Contour, NGINX, traefik

API Gateway
SCALE, Ambassador, Kong, MuleSoft, Netflix Zuul Ostrich Zimbra

Service Mesh
LINKERD (CNCF Incubating)
Istio, NETFLIX ZUUL, TURBINE LABS, vamp

Runtime

Cloud-Native Storage
ROOK (CNCF Incubating)
Arrikto, ceph, CSI, DATERA, DELL EMC, DIAMANTI, elastifile, GLUSTER, HATCHWAY, HEDVIG, Hewlett Packard Enterprise, kasten, LeoFS, LIZARDFS, MINIO, NetApp, OpenEBS, OpenIO, openSDS, portworx, PURE STORAGE, Quobyte, REX-Ray, ROBIN, Sheepdog, STORAGEOS, SWIFT, TRITON Object Storage

Container Runtime
containerd (CNCF Incubating)
rkt (CNCF Incubating)
cri-o, Google Cloud gVisor, kata, lxd, Pouch, OPEN STACK, Singularity, SmartOS

Cloud-Native Network
CNI (CNCF Incubating)
alcide, Aporeto, AVIATRIX, Big Switch, cilium, Contiv, CUMULUS, flannel, GuardiCore, LIGATO, midonet, MULTUS, VMware NSX, navegnetworks, OCTARINE, OVS Open vSwitch, CALICO, ROMANA, tungstenfabric, weave net

Provisioning

Automation & Configuration
ANSIBLE, AWS CloudFormation, BOSH, CFEngine, CHEF, CLOUDIFY, Digital Rebar, FOREMAN, Infrakit, juju, Kubicorn, LINUXKIT, MAAS, ManageIQ, openstack, pulumi, puppet, RUNDECK, SALTSTACK, StackStorm, Terraform, vmware

Container Registries
HARBOR (Cloud Native Sandbox)
Amazon ECR, Azure Registry, codefresh REGISTRY, Docker Registry, Google Container Registry, IBM Cloud Container Registry, JFrog Artifactory, Portus, ATOMIC, QUAY

Security & Compliance
notary (CNCF Incubating)
TUF (CNCF Incubating)
Open Policy Agent (Cloud Native Sandbox)
anchore, aqua, BLACK DUCK, clair, Datica, FOSSA, Grafeas, kube-bench, kube-hunter, NeuVector, OpenSCAP, ORACLE POLICY AUTOMATION, ORY / Hydra, Sonatype Nexus, StackRox, Sysdig Falco, Twistlock, WhiteSource

Key Management
spiffe (Cloud Native Sandbox)
SPIRE (Cloud Native Sandbox)
CYBERARK CONJUR, FREEDCLOAK, KeyWhiz, KNOX, LYK CONFIDANT, Teleport, Vault

Cloud

Public
AlibabaCloud, aws, Baidu Cloud, DigitalOcean, EXOSCALE, FUJITSU, Google Cloud, HUAWEI, IBM Cloud, Joyent, Microsoft Azure, ORACLE, packet, Tencent Cloud

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path

l.cncf.io

CLOUD NATIVE Landscape
CLOUD NATIVE COMPUTING FOUNDATION
Redpoint Amplify PARTNERS

Platform

Certified Kubernetes - Distribution
Giant Swarm, HUAWEI, IBM Cloud, inspur, inwinSTACK, JD.COM, Joyent, PHAROS, kube-spawn, Kubermatic, kublr, MESOSPHERE, METALK8S, MIRANTIS, navops, NetEase Cloud, OPENSHIFT, ORACLE, Pivotal, PLATFORM9, portworx, QFusion, QINIU, RANCHER, ROBIN, STACKPOINT, SUPERGIANT, SUSE, TECTONIC, Telekube, Typhoon, vmware, 云基 BaiduBS

Certified Kubernetes - Hosted
AlibabaCloud, AmazonEKS, Azure Container Service, Microsoft Azure, Baidu Cloud, 博云 BisCloud, catalyze.io, CISCO, EasyStack, eBaoCloud, eXing Technology, Google Kubernetes Engine, 临云科技, HASURA, HUAWEI, IBM Cloud Kubernetes Service, nirmata, ORACLE, rackspace, SAMSUNG SDS, SAP, SysEleven, Tencent Cloud, 时速云, vmware, ZTE

Certified Kubernetes - Installer
CableLabs, Gardener, Google Cloud, heptio, kops, KSS-TEW, MAGNUM, weaveworks

Non-Certified Kubernetes
STRATOSCALE

PaaS/Container Service
AETHER, APPLICATION RUNTIME, Flynn, GALACTIC FOG, heroku, HYPER.SH, JFrogNet, KONTENA, Lightbend, No Code, PaaSta, platform.sh, portainer.io, Scalingo, Tsuru

Observability and Analysis

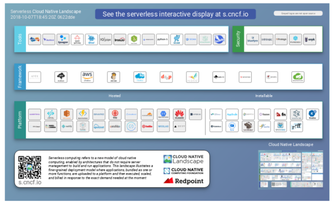
Monitoring
Prometheus (CNCF Graduated)
cortex (Cloud Native Sandbox)
OPENMETRICS (Cloud Native Sandbox)
Amazon CloudWatch, APPDYNAMICS, AppNeta, appoptics, Azure Monitor, catchpoint, centreon, CloudHealth, COSCALE, DATADOG, dynatrace, Google Stackdriver, Grafana, graphite, Heavyfoot, honeycomb, icinga, influxdata, INSTANA, IRONdb, librato, LIGHTSTEP, LogicMonitor, Nagios, netdata, New Relic, NexClipper, NODESOURCE, NUTANIX, OpenTSDB, Outlyer, Sensu, SENTRY, SignalFx, Snap, StackState, Sysdig, Thanos, uptime, WAVEFRONT, weave cloud, weave scope

Logging
fluentd (CNCF Incubating)
elastic, graylog, HUMIO, LOGGLY, logz.io, loom networks, SCALYR, sematext, splunk, sumologic

Tracing
JAEGER (CNCF Incubating)
OPENTRACING (CNCF Incubating)
Skywalking, Spring Cloud Sleuth, ZIPKIN

Chaos Engineering
Chaos Toolkit, Gremlin, LITMUS, PowerfulSeal

Serverless



Special

Kubernetes Certified Service Provider
accenture, 博云 BisCloud, Alibaba Cloud, 灵雀云 alauda.io, bitnami, 博云 BisCloud, Booz | Allen | Hamilton, boxboat, CONTINO, CoreOS, DaoCloud, Doil, EasyStack, eXing Technology, GhostCloud, Giant Swarm, HUAWEI, kumina, LIVEWIRE, loodse, MIRANTIS, mobilise, nirmata, NEW CONTEXT, OCTO, Reactive Ops, RX-M, SAMSUNG SDS, SAP, softserve, STACKPOINT, SUPERGIANT, TREASURE DATA, 时速云, 云基 BaiduBS, 天翅 VOLUTECH

Training Partner
CloudOps, CloudTogether, DaoCloud, loodse, inwinSTACK, LINUX TRAINING, RX-M, 时速云

2018

CNCF Cloud Native Landscape
2019-06-26T02:23:54Z 1753e1b

Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io

Greyed logos are not open source

App Definition and Development

Database
CNCF Incubating: TiKV, Vitess
CarbonData, Ignite, ArangoDB, BIGCHAINDB, cassandra, CockroachDB, Couchbase, CRATE.IO, CRUX, Dgraph, druid, FoundationDB, Hadoop, HazelCast IMDG, IBM DB2, Iguazio, Infinispan, InterSystems, MariaDB, MEMSQL, SQLServer, mongoDB, MySQL, neo4j, noms, NUODB, ORACLE DATABASE, OrientDB, Percona, pilosa, PostgreSQL, presto, Qubole, redis, RethinkDB, SCYLLA, snowflake, software, STOLON, TiDB, VERTICA, YugaByte

Streaming & Messaging
CNCF Incubating: NATS
Amazon Kinesis, HERON, nifi, Apache RocketMQ, Apache Spark, STORM, beam, cloudevents, Flink, Google Cloud Dataflow, hazelcast JET, kafka, OpenMessaging, Pachyderm, PULSAR, RabbitMQ, StreamSets, STRIMZI, talend

Application Definition & Image Build
CNCF Incubating: HELM
apache brooklyn, bitnami, Buildpacks.io, habitat, Kaniko, KubeVirt, MIRANTIS Virtlet, DRAFT, OPENAPI INITIATIVE, OPENFAAS FRAMEWORK, Packer, podman, ServiceComb, Ship Nautilus, SKAFFOLD, squash, TILT

Continuous Integration & Delivery
AppVeyor, argo, Azure Pipelines, Bamboo, BRIGADE, Buildkite, circleci, Skycap, cloudbees, codefresh, CODESHIP, Concourse, Drone, Electric Cloud, weave flagger, GITXUBE, GitLab, go, Google Cloud Build, harness, Jenkins, JenkinsX, Octopus Deploy, puppet Pipelines for Containers, ScrewDriver.cd, Semaphore, shippable, Spinnaker, TeamCity, TERRAFORM, Travis CI, OPENLEGACY, weave flux, wercker, XL DEPLOY, ZUUL

Orchestration & Management

Scheduling & Orchestration
CNCF Graduated: kubernetes
Amazon ECS, MESOS, Azure Service Fabric, Crossplane, SHIPYARD, Nomad

Coordination & Service Discovery
CNCF Graduated: CoreDNS
CNCF Incubating: etcd
Zookeeper, Consul, NACOS, NETFLIX OSS Eureka

Remote Procedure Call
CNCF Incubating: gRPC
Apache Thrift, JVXRS, DUBBO, SOFARPC

Service Proxy
CNCF Graduated: envoy
AVI Networks, CITRIX, f5, HAPROXY, NGINX, OPENRESTY, CONTOUR, GIMBAL, Skipper, SOFAMosn, traffik

API Gateway
3SCALE, Ambassador, EXPRESS GATEWAY, Gloo, Kong, krakenD, Platform, MuleSoft, Sentinel, Tyk

Service Mesh
CNCF Incubating: LINKERD
Grey Matter, Istio, NETFLIX OSS Zuul, SuperGloo, vamp

Runtime

Cloud-Native Storage
CNCF Incubating: ROOK
Arrikto, ceph, ChubaoFS, CSI, DATERA, DELL EMC, DIAMANTI, elastifile, GLUSTER, HATCHWAY, HEDVIG, Hewlett Packard Enterprise, INFINIDAT, kasten, LeoFS, LONGHORN, MINIO, MooseFS, NetApp, OpenEBS, OpenIO, openSDS, portworx, PURE STORAGE, Quobyte, redukio, ROBIN, RING, STORAGEOS, SWIFT, TRITON Object Storage, VRCloudFile, ZENKO

Container Runtime
CNCF Graduated: containerd
CNCF Incubating: cri-o, rkt
Firecracker, gVisor, kata, lxd, Nabla Containers, Pouch, OPEN CONTAINER Form, Singularity, SmartOS, unik

Cloud-Native Network
CNCF Incubating: CNI
alcide, Aporeto, aviatrix, big switch, cilium, Contiv, CUMULUS, DANM, io, flannel, GuardiCore, LIGATO, MULTUS, Network Service Mesh, VMware NSX, navegnetworks, OVS Open vSwitch, CALICO, tungstenfabric, weave net

Provisioning

Automation & Configuration
airship, ANSIBLE, Apollo, AWS CloudFormation, BOSH, CFEngine, CHEF, CLOUDIFY, FOREMAN, juju, KubeEdge, Kubiform, LINUXKIT, MAAS, ManageIQ, openstack, VELERO, pulumi, puppet, RUNDECK, SALTSTACK, StackStorm, Terraform, vmware

Container Registry
CNCF Incubating: HARBOR
Amazon ECR, Azure Registry, codefresh REGISTRY, RegistrY, Dragonfly, Google Container Registry, IBM Cloud Container Registry, JFrog Artifactory, Kraken, Portus, QUAY

Security & Compliance
CNCF Incubating: notary, Open Policy Agent, TUF
anchore, aqua, BLACK DUCK, BLOOMBASE, clair, Datica, Falco, FOSSA, Grafeas, kube-bench, kube-hunter, NeuVector, OpenSCAP, ORACLE POLICY AUTOMATION, ORI7 / Hydra, SONOBUOY, snyk, Sonatype Nexus, StackRox, TIGERA, Twistlock, WhiteSource

Key Management
CYBERARK CONJUR, KEYCLOAK, Knox, CROSSWORD, spiffe, SPIRE, Square Keywhiz, SSO, Teleport, Vault

Cloud

Public
Alibaba Cloud, aws, BAIDU AI CLOUD, DigitalOcean, EXOSCALE, FUJITSU, Google Cloud, HUAWEI, IBM Cloud, Joyent, linode, Microsoft Azure, ORACLE, packet, Scaleway, Tencent Cloud

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path

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CLOUD NATIVE COMPUTING FOUNDATION
CLOUD NATIVE Landscape
Redpoint Amplify PARTNERS

Special

Kubernetes Certified Service Provider
accenture, Acornsoft, ADFOLKS, Alibaba Cloud, APPVIA, BAIDU AI CLOUD, bitnami, BoxBoat, Boxc | Alien | Hamilton, boxboat, BROBRIDGE, caicloud, CANONICAL, catalyst cloud, CloudOps, CloudYuga Guru, CLOUDZONE, cognishive, ComponentSoft, Container Solutions, CONTINO, contextplane, CORE HIVE, Core OS, CREATIONLINE, INC., Cuemby, DaoCloud, Danomatic, DATA ESSENTIAL, DATAWORKS, DELL Technologies Consulting, Deloitte., DIAMANTI, Doil, EasyStack, elastisys, ELASTX, FLANT, Giant Swarm, grape up, GRAVITATIONAL, 博云科技 HARMONY CLOUD, heptio, HUAWEI, IBM Cloud, INFRACLOUD, inovex, inwinSTACK, ISOTOMA, JETSTACK, kim volk, KIRATECH, kublr, kumina, loodse, MESOSPHERE, MIRANTIS, mobilise, navigas, NEBULAWORKS, NetEase Cloud, neudato, NEW CONTEXT, nirmata, NTT data, OCTO, origoss SOLUTIONS, OTEEMO, PLATFORM9, polar squad, PRAGMA, PRODYNA, rackspace, RANCHER, Reactive Ops, RX-M, SAMSUNG SDS, SAP, SIGHUP, Southbridge, STACKPOINT, SUPERGIANT, SUSE, 时速云, teuto.Stack, THE SCALE FACTORY, TRANSKAPP, TREASURE DATA, VA LINUX SYSTEMS, vshn.ch, weaveworks, 高云都会, WOGUTECH, ZTE

Kubernetes Training Partner
Acornsoft, 灵雀云 alauda.cn, boxboat, caicloud, CloudOps, CloudYuga Guru, ComponentSoft, Container Solutions, contextplane, CREATIONLINE, INC., DaoCloud, Danomatic, Doil, EasyStack, 博云科技 HARMONY CLOUD, HUAWEI, inwinSTACK, KIRATECH, loodse, MESOSPHERE, NEBULAWORKS, OTEEMO, PRODYNA, RX-M, Southbridge, SUPERGIANT, 时速云, LINUX FOUNDATION TRAINING

Platform

Certified Kubernetes - Distribution
AMULUS STACK, cloudo Cloud Enterprise, cloudo Container Platform, 灵雀云 alauda.cn, SANZHIKUN, caicloud, CANONICAL, cisco, Maestro, CONTAINER RUNTIME, Cocktail Cloud, containership, DaoCloud, DIAMANTI, docker, docker, EasyStack, ENC, ERICSSON, Giant Swarm, Gravity, HUAWEI, IBM Cloud, inwinSTACK, JD.COM, Joyent, K8S, KONTENA, kube-spawn, kubedee, Kubermatic, Containerum, KUBIC, kublr, MESOSPHERE, METALK8S, 灵云, MIRANTIS, NetApp, NetEase Cloud, NetEase Cloud, ORACLE, Pivotal, PLATFORM9, QINIU, RANCHER, RED HAT OPENSHIFT, ROBIN, SUSE, SYMPLEDGE, 四方有云, Typhoon, vmware, VMware Cloud PKS, 高云都会

Certified Kubernetes - Hosted
Microsoft Azure, Alibaba Cloud, AmazonEKS, Microsoft Azure, Azure Kubernetes Service (AKS), BAIDU AI CLOUD, 博云 BoCloud, catalyst cloud, DigitalOcean, eBaoCloud, ELASTX, Google Kubernetes Engine, 盛云科技 HARMONY CLOUD, HUAWEI, IBM Cloud Kubernetes Service, intellect SEEC, JDCloud, Kingsoft Cloud, MASS BIG DATA SOLUTIONS, nirmata, NUTANIX, ORACLE, OVH, rackspace, SAMSUNG SDS, SAP, Scaleway, SOFASTACK, SysEleven, Tencent Cloud, 时速云, UCLOUD, VEEKOO-DBS, vmware, ZTE

Certified Kubernetes - Installer
CableLabs, FURY, Gardener, Google Cloud, kops, kubeadm, KubeOne, AKS-TEK, KUBESPRAY, linode, MAGNUM, MicroK8s, minikube, puppet, RANCHER, SUPERGIANT, vmware, 高云都会

PaaS/Container Service
ATOMIC, APPLICATION RUNTIME, Flynn, heroku, jHipster, Lightbend, No Code, PaaSta, platform.sh, portainer.io, Scalingo, Tsuru, YELLOWDOG

Observability and Analysis

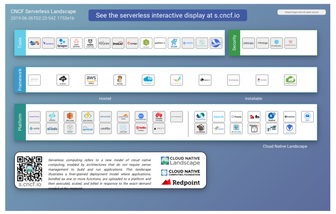
Monitoring
Prometheus CNCF Graduated
Amazon CloudWatch, APPDYNAMICS, AppNeta, appoptics, Azure Monitor, bluematador, catchpoint, centreon, CloudHealth, cortex, DATADOG, dynatrace, Google Stackdriver, Grafana, graphite, Hiverage, honeycomb, icinga, influxdata, INSTANA, IRONdb, kiali, LIGHTSTEP, LogicMonitor, Nagios, netdata, New Relic, NexClipper, NODESOURCE, NUTANIX, OPENMETRICS, OPENTSDB, Outlyer, replex, riverbed, Sensu, SENTRY, SignalFx, StackState, STORMFORGE, Sysdig, Thanos, 博云, trickster, WAVEFRONT VMWARE, weave cloud, weave scope, ZABBIX

Logging
fluentd CNCF Graduated
elastic, Grafana loki, graylog, Humio, logdna, LOGGLY, logstash, logz.io, loom, SCALYR, sematext, splunk, sumo logic

Tracing
JAEGER CNCF Incubating
OPENTRACING CNCF Incubating
OpenTelemetry, Skywalking, SOFATrace, Spring Cloud Sleuth, ZIPKIN

Chaos Engineering
Activation Hub Automatic Fault, ChaosToolkit, ChaoBlade, chaoskube, Gremlin, LiTMUS, Netflix Chaos Monkey

Serverless



Public

Cloud

Alibaba Cloud
aws
BAIDU AI CLOUD
DigitalOcean
EXOSCALE
FUJITSU
Google Cloud
HUAWEI
IBM Cloud
Joyent
linode
Microsoft Azure
ORACLE
packet
Scaleway
Tencent Cloud

l.cncf.io

This landscape is inten
a map through the pre
uncharted terrain of
native technologies. Th
many routes to deplo
cloud native applicatio
CNCF Projects represe
particularly well-travele

n & Image Build

bitnami
Buildpacks.io
DRAFT
MIRANTIS Virtlet
OPEN SERVICE BROKER API
podman
ServiceComb
TILT

Continuous Integration & Delivery

AppVeyor
argo
Azure Pipelines
Bamboo
BRIGADE
Buildkite
circleci
Skycap
cloudbees
codefresh
CODESHIP
Concourse
Drone
Electric Cloud
weave flagger
GITKUBE
GitLab
go
Google Cloud Build
harness
Jenkins
JenkinsX
Octopus Deploy
puppet Pipelines for Containers
Screwdriver.cd
Semaphore
shippable
Spinnaker
TeamCity
TEKTON
Travis CI
HYSCALE wavemaker
weave flux
wercker
DEPLOY
ZUUL

Certifie

AGILESTACKS
alauda Cloud Enterprise
CISCO
Maestro
docker
docker
HUAWEI
IBM Cloud
kube-spawn
kubedee
METALK8S
秒云 MIAOYUN.IO

API Gateway

Service Mesh

orm

es - Distribution

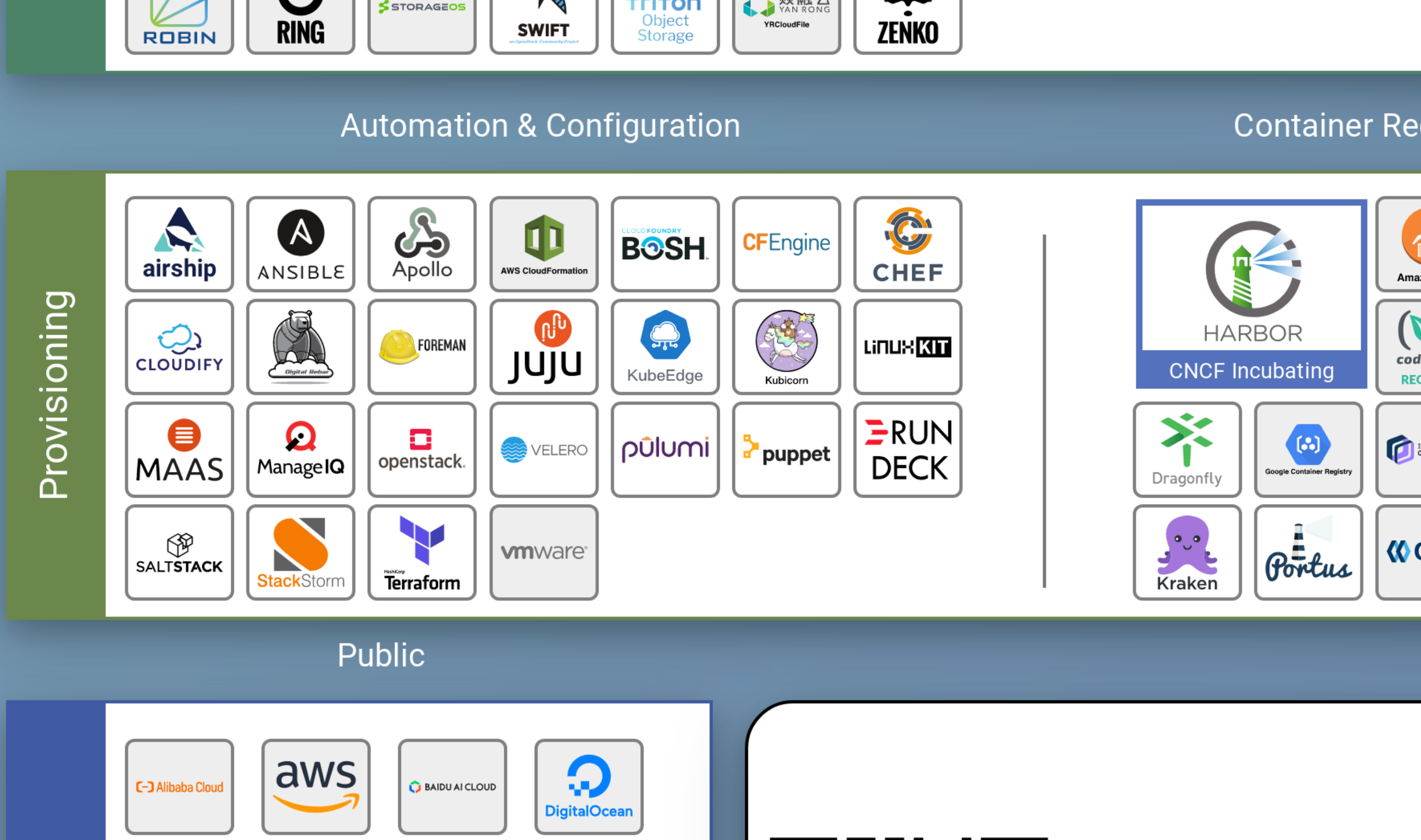
BANZAICLOUD
caicloud
CANONICAL
containership
DaoCloud
DIAMANTI
ERICSSON
Giant Swarm
Gravity
MADE BY GRAVITATIONAL
Joyent
KONTENA
Kubic
kublr
MESOSPHERE
NetEase Cloud
NetEase Cloud
ORACLE
RED HAT OPENSHIFT
ROBIN
SUSE

Observability and Analysis

Monitoring

Prometheus
CNCF Graduated

Amazon CloudWatch
APPDYNAMICS
AppNeta
appoptics
Azure Monitor
bluematador
catchpoint
centreon
CloudHealth
cortex
DATADOG
dynatrace
Google Stackdriver
Grafana
graphite
Honeybadger
honeycomb
ICINGA
influxdata
INSTANA
IRONdb
kiali
LIGHTSTEP
LogicMonitor
Nagios
netdata
New Relic
NexClipper
NODESOURCE
NUTANIX
OPENMETRICS
OPENTSDB
Outlyer
replex
riverbed
Sensu
SENTRY
SignalFx
StackState
STORMFORGER
Sysdig
Thanos
听云 TINGYUN
trickster
WAVEFRONT by vmware
weave cloud
weave scope
ZABBIX


ROBIN
RING
STORAGEOS
SWIFT
triton Object Storage
YAN RONG
YRCloudFile
ZENKO
Automation & Configuration
Container Re
Provisioning
airship
ANSIBLE
Apollo
AWS CloudFormation
CLOUD FOUNDRY BOSH
CFEngine
CHEF
CLOUDIFY
Digital Rebar
FOREMAN
juju
KubeEdge
Kubicorn
LINUX KIT
MAAS
ManageIQ
openstack.
VELERO
pulumi
puppet
RUN DECK
SALTSTACK
StackStorm
HashiCorp Terraform
vmware
HARBOR
CNCF Incubating
Dragonfly
Google Container Registry
Kraken
Portus
Public
Alibaba Cloud
aws
BAIDU AI CLOUD
DigitalOcean

CNCF Cloud Native Landscape
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Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io

Greyed logos are not open source

App Definition and Development

Database
CNCF Incubating: TiKV, Vitess
CarbonData, Ignite, ArangoDB, BIGCHAINDB, cassandra, CockroachDB, Couchbase, CRATE.IO, CRUX, Dgraph, druid, FoundationDB, Hadoop, HazelCast IMDG, IBM DB2, Iguazio, Infinispan, InterSystems, MariaDB, MEMSQL, SQLServer, mongoDB, MySQL, neo4j, noms, NUODB, ORACLE DATABASE, OrientDB, Percona, pilosa, PostgreSQL, presto, Qubole, redis, RethinkDB, SCYLLA, snowflake, software, STOLON, TiDB, VERTICA, YugaByte

Streaming & Messaging
CNCF Incubating: NATS
Amazon Kinesis, HERON, nifi, Apache RocketMQ, Apache Spark, STORM, beam, cloudevents, Flink, Google Cloud Dataflow, hazelcast JET, kafka, OpenMessaging, Pachyderm, PULSAR, RabbitMQ, StreamSets, STRIMZI, talend

Application Definition & Image Build
CNCF Incubating: HELM
apache brooklyn, bitnami, Buildpacks.io, habitat, Kaniko, KubeVirt, MIRANTIS Virtlet, DRAFT, OPENAPI INITIATIVE, OPENFAAS FRAMEWORK, Packer, podman, ServiceComb, Ship Nautilus, SKAFFOLD, squash, TILT

Continuous Integration & Delivery
AppVeyor, argo, Azure Pipelines, Bamboo, BRIGADE, Buildkite, circleci, Skycap, cloudbees, codefresh, CODESHIP, Concourse, Drone, Electric Cloud, weave flagger, GITXUBE, GitLab, go, Google Cloud Build, harness, Jenkins, JenkinsX, Octopus Deploy, puppet Pipelines for Containers, ScrewDriver.cd, Semaphore, shippable, Spinnaker, TeamCity, TERRAFORM, Travis CI, OPENLEGACY, weave flux, wercker, XL DEPLOY, ZUUL

Orchestration & Management

Scheduling & Orchestration
CNCF Graduated: kubernetes
Amazon ECS, MESOS, Azure Service Fabric, Crossplane, SHIPYARD, Nomad

Coordination & Service Discovery
CNCF Graduated: CoreDNS
CNCF Incubating: etcd
Zookeeper, Consul, NACOS, NETFLIX OSS Eureka

Remote Procedure Call
CNCF Incubating: gRPC
Apache Thrift, JVXRS, DUBBO, SOFARPC

Service Proxy
CNCF Graduated: envoy
AVI Networks, CITRIX, f5, HAPROXY, NGINX, OPENRESTY, CONTOUR, GIMBAL, Skipper, SOFAMosn, traffik

API Gateway
3SCALE, Ambassador, EXPRESS GATEWAY, Gloo, Kong, krakenD, Platform, MuleSoft, Sentinel, Tyk

Service Mesh
CNCF Incubating: LINKERD
Grey Matter, Istio, NETFLIX OSS Zuul, SuperGloo, vamp

Runtime

Cloud-Native Storage
CNCF Incubating: ROOK
Arrikto, ceph, ChubaoFS, CSI, DATERA, DELL EMC, DIAMANTI, elastifile, GLUSTER, HATCHWAY, HEDVIG, Hewlett Packard Enterprise, INFINIDAT, kasten, LeoFS, LONGHORN, MINIO, MooseFS, NetApp, OpenEBS, OpenIO, openSDS, portworx, PURE STORAGE, Quobyte, redukio, ROBIN, RING, STORAGEOS, SWIFT, TRITON Object Storage, VRCloudFile, ZENKO

Container Runtime
CNCF Graduated: containerd
CNCF Incubating: cri-o, rkt
Firecracker, gVisor, kata, lxd, Nabla Containers, Pouch, OPEN CONTAINER Form, Singularity, SmartOS, unik

Cloud-Native Network
CNCF Incubating: CNI
alcide, Aporeto, aviatrix, big switch, cilium, Contiv, CUMULUS, DANM, io, flannel, GuardiCore, LIGATO, MULTUS, Network Service Mesh, VMware NSX, navegnetworks, OVS Open vSwitch, CALICO, tungstenfabric, weave net

Provisioning

Automation & Configuration
airship, ANSIBLE, Apollo, AWS CloudFormation, BOSH, CFEngine, CHEF, CLOUDIFY, FOREMAN, juju, KubeEdge, Kubiform, LINUXKIT, MAAS, ManageIQ, openstack, VELERO, pulumi, puppet, RUNDECK, SALTSTACK, StackStorm, Terraform, vmware

Container Registry
CNCF Incubating: HARBOR
Amazon ECR, Azure Registry, codefresh REGISTRY, RegistrY, Dragonfly, Google Container Registry, IBM Cloud Container Registry, JFrog Artifactory, Kraken, Portus, QUAY

Security & Compliance
CNCF Incubating: notary, Open Policy Agent, TUF
anchore, aqua, BLACK DUCK, BLOOMBASE, clair, Datica, Falco, FOSSA, Grafeas, kube-bench, kube-hunter, NeuVector, OpenSCAP, ORACLE POLICY AUTOMATION, ORI7 / Hydra, SONOBUOY, snyk, Sonatype Nexus, StackRox, TIGERA, Twistlock, WhiteSource

Key Management
CYBERARK CONJUR, KEYCLOAK, Knox, CROSSWORD, spiffe, SPIRE, Square Keywhiz, SSO, Teleport, Vault

Cloud

Public
Alibaba Cloud, aws, BAIDU AI CLOUD, DigitalOcean, EXOSCALE, FUJITSU, Google Cloud, HUAWEI, IBM Cloud, Joyent, linode, Microsoft Azure, ORACLE, packet, Scaleway, Tencent Cloud

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path

l.cncf.io

CLOUD NATIVE COMPUTING FOUNDATION
CLOUD NATIVE Landscape
Redpoint Amplify PARTNERS

Special

Kubernetes Certified Service Provider
accenture, Acornsoft, ADFOLKS, Alibaba Cloud, APPVIA, BAIDU AI CLOUD, bitnami, BoxBoat, Boxc | Alien | Hamilton, boxboat, BROBRIDGE, caicloud, CANONICAL, catalyst cloud, CloudOps, CloudYuga Guru, CLOUDZONE, cognishive, ComponentSoft, Container Solutions, CONTINO, contextplane, CORE HIVE, Core OS, CREATIONLINE, INC., Cuemby, DaoCloud, Danomatic, DATA ESSENTIAL, DATAWORKS, DELL Technologies Consulting, Deloitte., DIAMANTI, Doil, EasyStack, elastisys, ELASTX, FLANT, Giant Swarm, grape up, GRAVITATIONAL, 博云科技 HARMONY CLOUD, heptio, HUAWEI, IBM Cloud, INFRACLOUD, inovex, inwinSTACK, ISOTOMA, JETSTACK, kim volk, KIRATECH, kublr, kumina, loodse, MESOSPHERE, MIRANTIS, mobilise, navigas, NEBULAWORKS, NetEase Cloud, neudato, NEW CONTEXT, nirmata, NTT data, OCTO, origoss SOLUTIONS, OTEEMO, PLATFORM9, polar squad, PRAGMA, PRODYNA, rackspace, RANCHER, Reactive Ops, RX-M, SAMSUNG SDS, SAP, SIGHUP, Southbridge, STACKPOINT, SUPERGIANT, SUSE, 时速云, teuto.Stack, THE SCALE FACTORY, TRANSKAPP, TREASURE DATA, VA LINUX SYSTEMS, vshn.ch, weaveworks, 高云都会, WOGUTECH, ZTE

Kubernetes Training Partner
Acornsoft, 灵雀云 alauda.cn, boxboat, caicloud, CloudOps, CloudYuga Guru, ComponentSoft, Container Solutions, contextplane, CREATIONLINE, INC., DaoCloud, Danomatic, Doil, EasyStack, 博云科技 HARMONY CLOUD, HUAWEI, inwinSTACK, KIRATECH, loodse, MESOSPHERE, NEBULAWORKS, OTEEMO, PRODYNA, RX-M, Southbridge, SUPERGIANT, 时速云, LINUX FOUNDATION TRAINING

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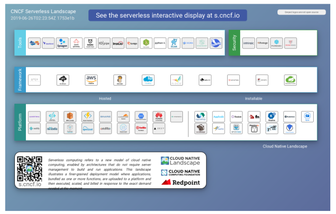
Serverless



CLOUD NATIVE
COMPUTING FOUNDATION

CLOUD NATIVE TRAIL MAP

The Cloud Native Landscape *l.cncf.io* has a large number of options. This Cloud Native Trail Map is a recommended process for leveraging open source, cloud native technologies. At each step, you can choose a vendor-supported offering or do it yourself, and everything after step #3 is optional based on your circumstances.

HELP ALONG THE WAY

A. Training and Certification

Consider training offerings from CNCF and then take the exam to become a Certified Kubernetes Administrator or a Certified Kubernetes Application Developer

cncf.io/training

B. Consulting Help

If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider

cncf.io/kcsp

C. Join CNCF's End User Community

For companies that don't offer cloud native services externally

cncf.io/enduser

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.

l.cncf.io

v20190524

1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices

2. CI/CD

- Setup Continuous Integration/Continuous Delivery (CI/CD) so that changes to your source code automatically result in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
- Setup automated rollouts, roll backs and testing

3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/ck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application

kubernetes — CNCF Graduated
HELM — CNCF Incubating

4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger

Prometheus — CNCF Graduated
fluentd — CNCF Graduated
OPENTRACING — CNCF Incubating
JAEGER — CNCF Incubating

5. SERVICE PROXY, DISCOVERY, & MESH

- CoreDNS is a fast and flexible tool that is useful for service discovery
- Envoy and Linkerd each enable service mesh architectures
- They offer health checking, routing, and load balancing

envoy — CNCF Graduated
CoreDNS — CNCF Graduated
LINKERD — CNCF Incubating

6. NETWORKING & POLICY

To enable more flexible networking, use a CNI-compliant network project like Calico, Flannel, or Weave Net. Open Policy Agent (OPA) is a general-purpose policy engine with uses ranging from authorization and admission control to data filtering.

CNI — CNCF Incubating
Open Policy Agent — CNCF Incubating

7. DISTRIBUTED DATABASE & STORAGE

When you need more resiliency and scalability than you can get from a single database, Vitess is a good option for running MySQL at scale through sharding. Rook is a storage orchestrator that integrates a diverse set of storage solutions into Kubernetes. Serving as the "brain" of Kubernetes, etcd provides a reliable way to store data across a cluster of machines. TiKV is a high performant distributed transactional key-value store written in Rust.

Vitess — CNCF Incubating
ROOK — CNCF Incubating
etcd — CNCF Incubating
KV — CNCF Incubating

8. STREAMING & MESSAGING

When you need higher performance than JSON-REST, consider using gRPC or NATS. gRPC is a universal RPC framework. NATS is a multi-modal messaging system that includes request/reply, pub/sub and load balanced queues.

gRPC — CNCF Incubating
NATS — CNCF Incubating

9. CONTAINER REGISTRY & RUNTIME

Harbor is a registry that stores, signs, and scans content. You can use alternative container runtimes. The most common, all of which are OCI-compliant, are containerd, rkt and CRI-O.

containerd — CNCF Graduated
HARBOR — CNCF Incubating
rkt — CNCF Incubating
cri-o — CNCF Incubating

10. SOFTWARE DISTRIBUTION

If you need to do secure software distribution, evaluate Notary, an implementation of The Update Framework.

Notary — CNCF Incubating
TUF — CNCF Incubating

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etcd

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Prometheus — CNCF Graduated

Fluentd — CNCF Graduated

OPENTRACING — CNCF Incubating

JAEGER — CNCF Incubating

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COMPUTING FOUNDATION

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If you want assistance with Kubernetes and the surrounding ecosystem, consider leveraging a Kubernetes Certified Service Provider

cncf.io/kcsp

C. Join CNCF's End User Community

For companies that don't offer cloud native services externally

cncf.io/enduser

WHAT IS CLOUD NATIVE?

Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

The Cloud Native Computing Foundation seeks to drive adoption of this paradigm by fostering and sustaining an ecosystem of open source, vendor-neutral projects. We democratize state-of-the-art patterns to make these innovations accessible for everyone.

l.cncf.io

v20190524

1. CONTAINERIZATION

- Commonly done with Docker containers
- Any size application and dependencies (even PDP-11 code running on an emulator) can be containerized
- Over time, you should aspire towards splitting suitable applications and writing future functionality as microservices

2. CI/CD

- Setup Continuous Integration/Continuous Delivery (CI/CD) so that changes to your source code automatically result in a new container being built, tested, and deployed to staging and eventually, perhaps, to production
- Setup automated rollouts, roll backs and testing

3. ORCHESTRATION & APPLICATION DEFINITION

- Kubernetes is the market-leading orchestration solution
- You should select a Certified Kubernetes Distribution, Hosted Platform, or Installer: cncf.io/ck
- Helm Charts help you define, install, and upgrade even the most complex Kubernetes application

kubernetes — CNCF Graduated
HELM — CNCF Incubating

4. OBSERVABILITY & ANALYSIS

- Pick solutions for monitoring, logging and tracing
- Consider CNCF projects Prometheus for monitoring, Fluentd for logging and Jaeger for Tracing
- For tracing, look for an OpenTracing-compatible implementation like Jaeger

Prometheus — CNCF Graduated
fluentd — CNCF Graduated
OPENTRACING — CNCF Incubating
JAEGER — CNCF Incubating

5. SERVICE PROXY, DISCOVERY, & MESH

- CoreDNS is a fast and flexible tool that is useful for service discovery
- Envoy and Linkerd each enable service mesh architectures
- They offer health checking, routing, and load balancing

envoy — CNCF Graduated
CoreDNS — CNCF Graduated
LINKERD — CNCF Incubating

6. NETWORKING & POLICY

To enable more flexible networking, use a CNI-compliant network project like Calico, Flannel, or Weave Net. Open Policy Agent (OPA) is a general-purpose policy engine with uses ranging from authorization and admission control to data filtering.

CNI — CNCF Incubating
Open Policy Agent — CNCF Incubating

7. DISTRIBUTED DATABASE & STORAGE

When you need more resiliency and scalability than you can get from a single database, Vitess is a good option for running MySQL at scale through sharding. Rook is a storage orchestrator that integrates a diverse set of storage solutions into Kubernetes. Serving as the "brain" of Kubernetes, etcd provides a reliable way to store data across a cluster of machines. TiKV is a high performant distributed transactional key-value store written in Rust.

Vitess — CNCF Incubating
ROOK — CNCF Incubating
etcd — CNCF Incubating
KV — CNCF Incubating

8. STREAMING & MESSAGING

When you need higher performance than JSON-REST, consider using gRPC or NATS. gRPC is a universal RPC framework. NATS is a multi-modal messaging system that includes request/reply, pub/sub and load balanced queues.

gRPC — CNCF Incubating
NATS — CNCF Incubating

9. CONTAINER REGISTRY & RUNTIME

Harbor is a registry that stores, signs, and scans content. You can use alternative container runtimes. The most common, all of which are OCI-compliant, are containerd, rkt and CRI-O.

containerd — CNCF Graduated
HARBOR — CNCF Incubating
rkt — CNCF Incubating
cri-o — CNCF Incubating

10. SOFTWARE DISTRIBUTION

If you need to do secure software distribution, evaluate Notary, an implementation of The Update Framework.

Notary — CNCF Incubating
TUF — CNCF Incubating

https://landscape.cncf.io/

THOUGHTWORKS RADAR

ADOPT

38. Cypress
39. Jupyter
40. LocalStack
41. Terraform
42. UI dev environments

TRIAL

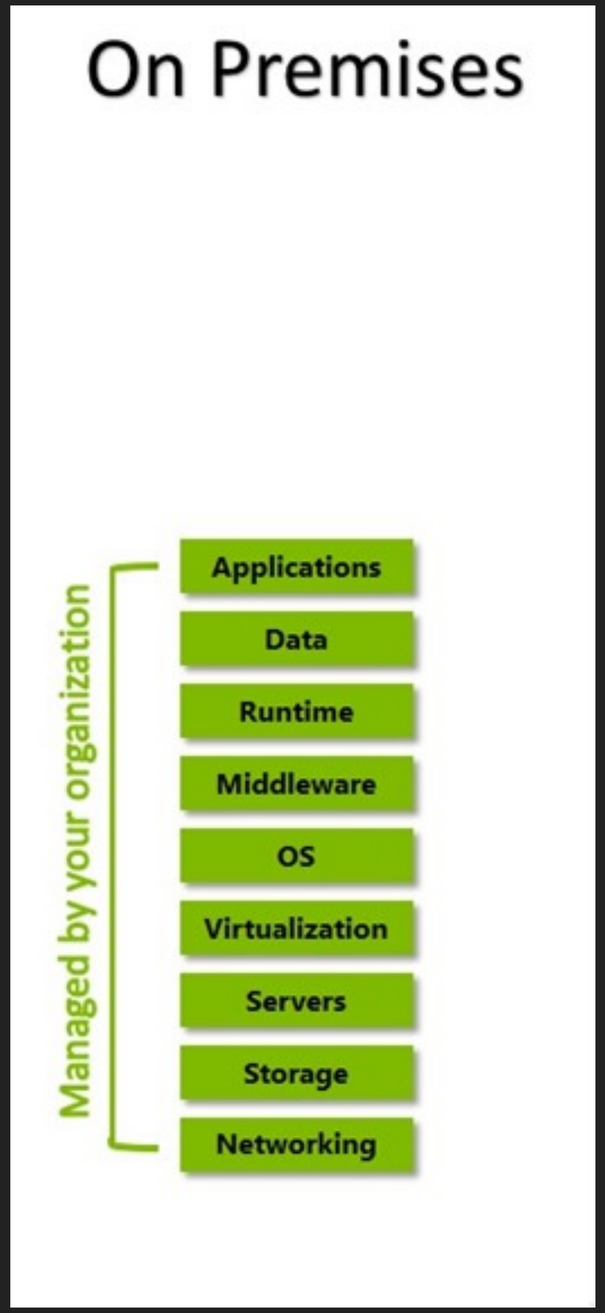
43. AnyStatus
44. AVA
45. batect
46. Elasticsearch LTR
47. Helm
48. InSpec
49. Lottie
50. Stolon
51. TestCafe
52. Traefik

ASSESS

53. Anka

https://www.thoughtworks.com/radar/tools

@jbjon



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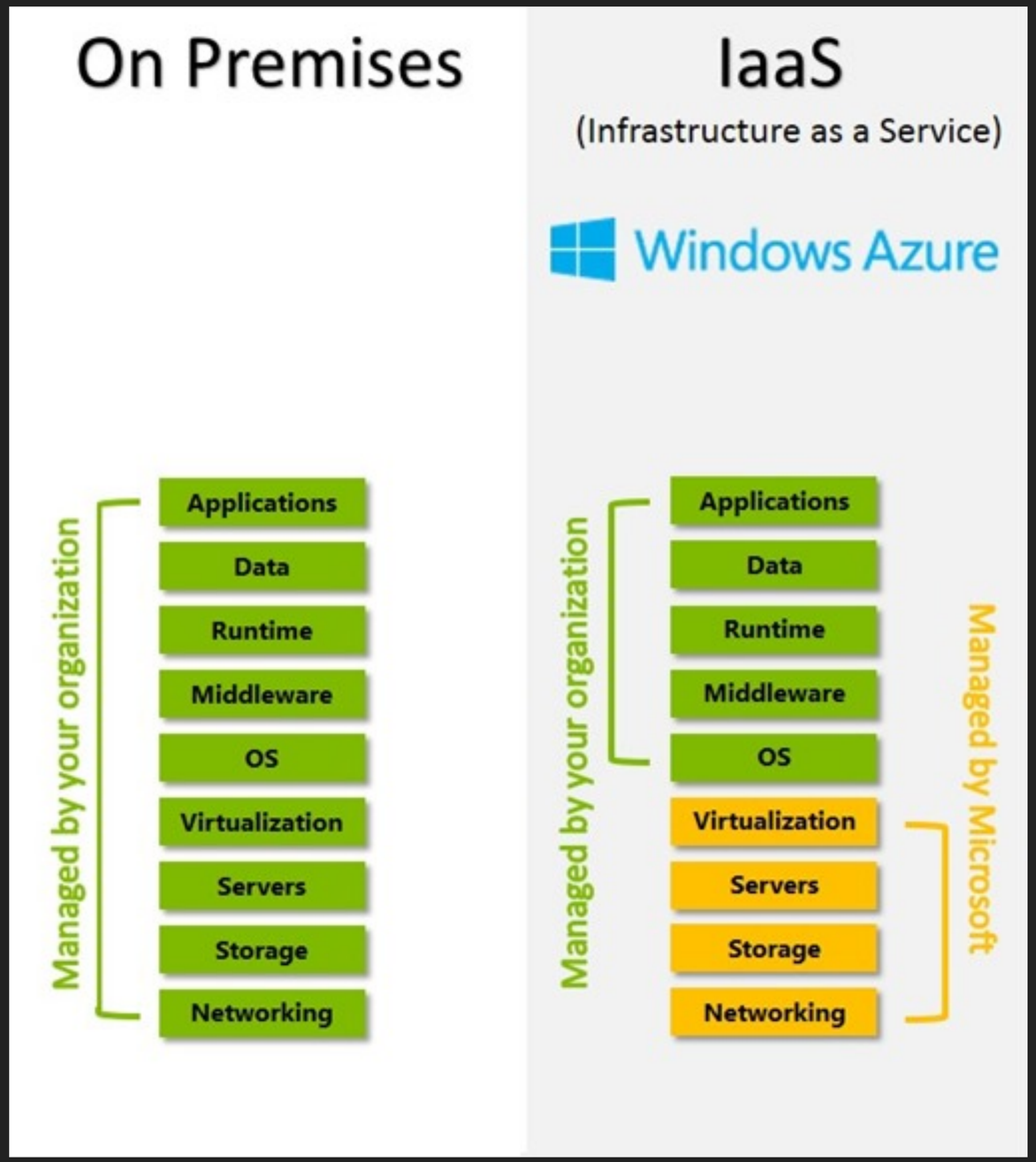

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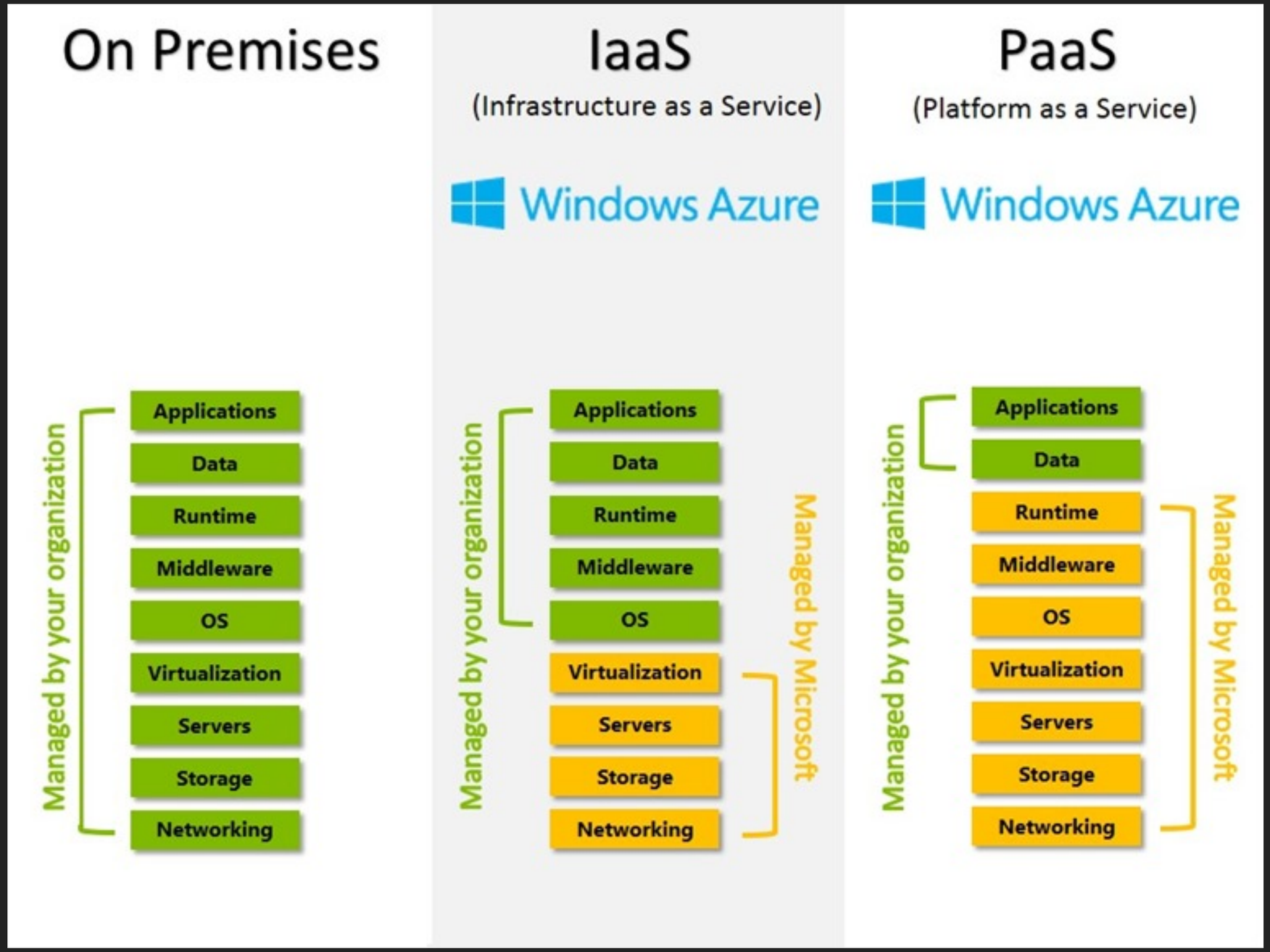

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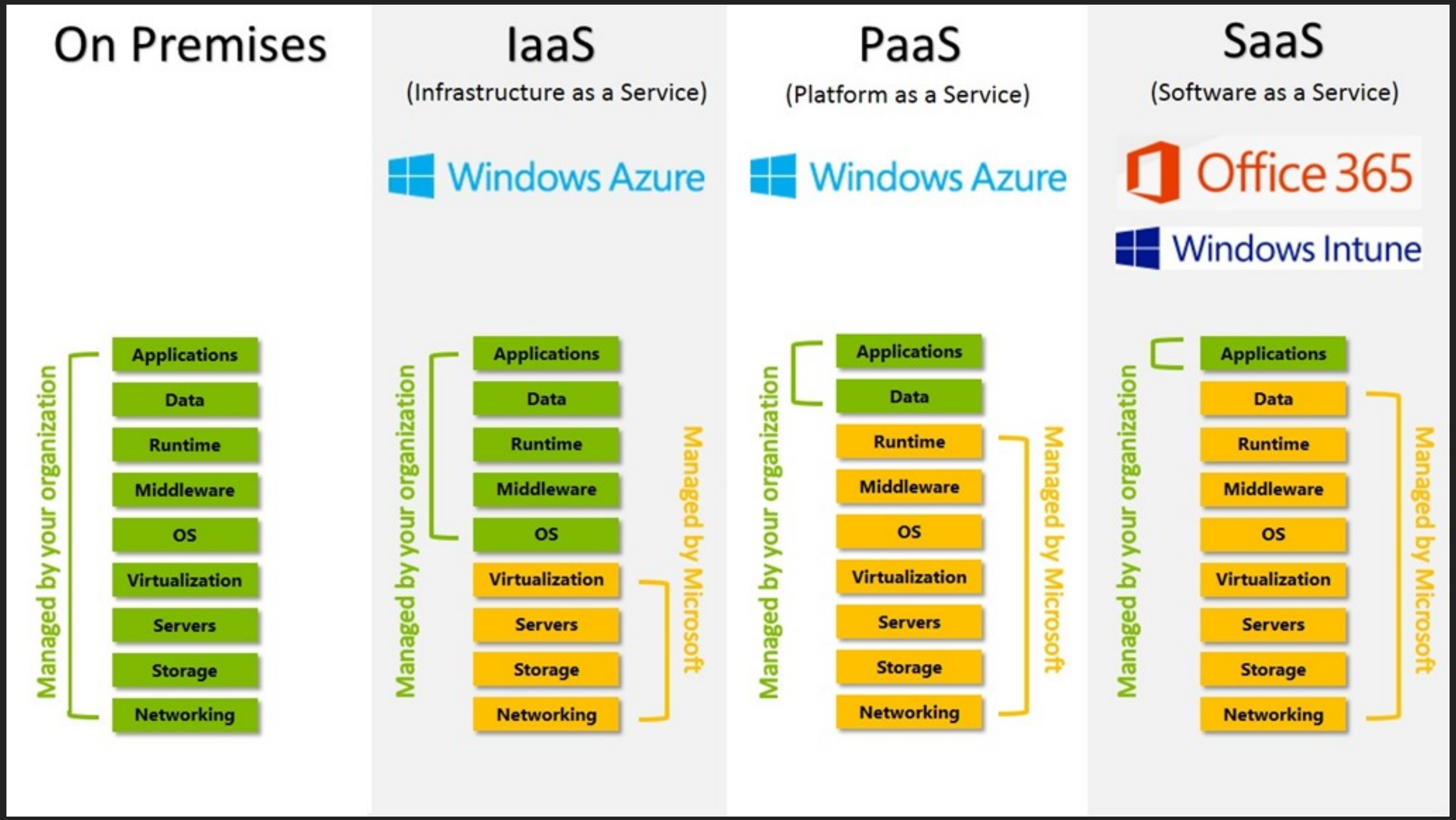

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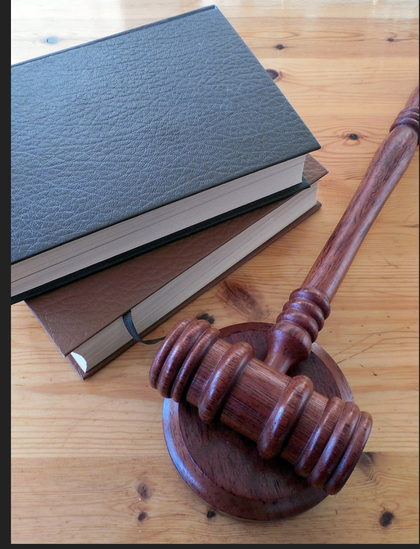
WHY BOTHER DEFINING YOUR OWN INFRASTRUCTURE IN CODE?

REGULATORY REQUIREMENTS



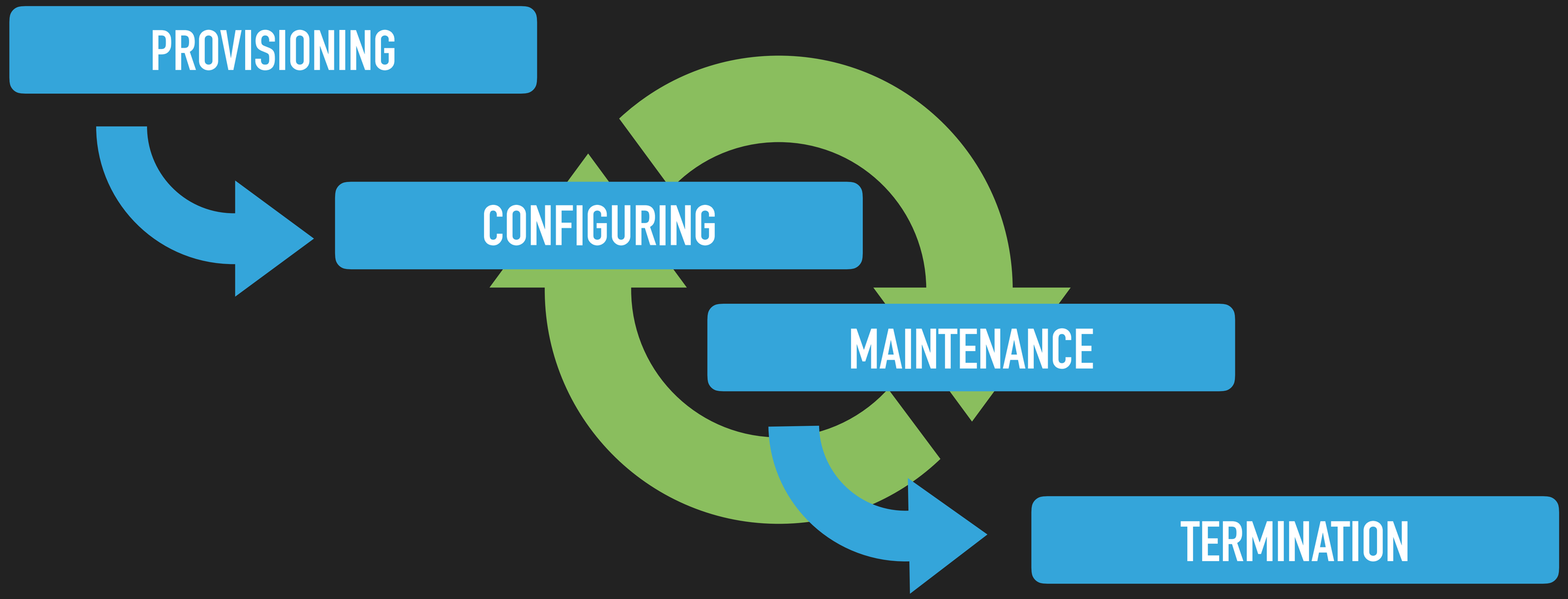
3RD PARTY SOLUTION UNCERTAINTY

HARDEN APPLICATION HOSTING

AVOID VENDOR LOCK-IN


MONDIAL
Franco
Verde Sud
MORA
Ortaggi
Terra
COFERASTA

THE FOUR STAGES OF INFRASTRUCTURE



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- Started using ISO images

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- Risk of out of date, unpatched VMs

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- ‘Snowflake servers’
- Configuration Management software like Puppet & Chef

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- Scripting can help ensure consistency

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- Treating servers like “pets, not cattle”

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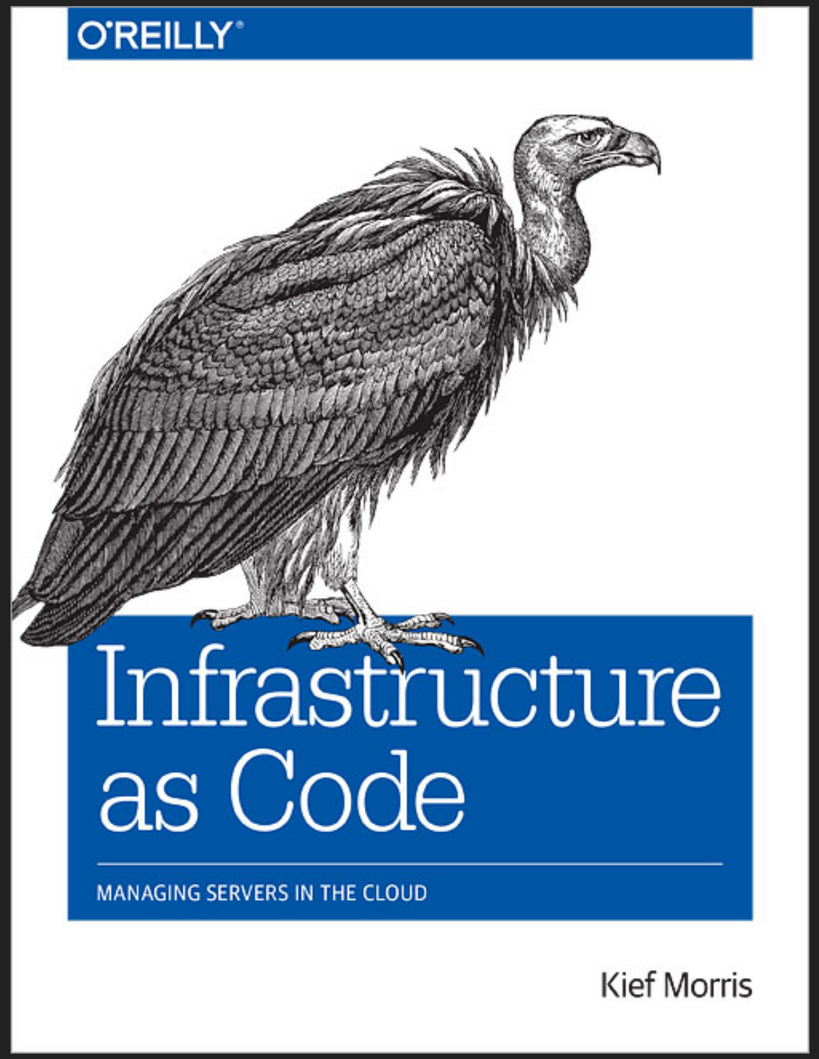
- Treating servers like “pets, not cattle”
- Anti-pattern: Celebrating up-time
- Plan for the fact an instance could disappear

4 GOALS OF INFRASTRUCTURE AS CODE



4 GOALS OF INFRASTRUCTURE AS CODE

Kief Morris

4 GOALS OF INFRASTRUCTURE AS CODE

I.T. INFRASTRUCTURE SUPPORTS & ENABLES CHANGE

Kief Morris

4 GOALS OF INFRASTRUCTURE AS CODE

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4 GOALS OF INFRASTRUCTURE AS CODE

CHANGES TO THE SYSTEM ARE ROUTINE WITHOUT DRAMA OR STRESS

Kief Morris

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4 GOALS OF INFRASTRUCTURE AS CODE

I.T. STAFF SPEND THEIR TIME ON VALUABLE THINGS…
NOT REPETITIVE TASKS

Kief Morris

4 GOALS OF INFRASTRUCTURE AS CODE

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4 GOALS OF INFRASTRUCTURE AS CODE

USERS ARE ABLE TO DEFINE, PROVISION, AND MANAGE THE RESOURCES THEY NEED WITHOUT I.T. STAFF TO DO IT FOR THEM

Kief Morris

DEFINITION TOOLS

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  - have scriptable interfaces

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  - can be tailored through config
  - allow tasks to be defined in code
  - the definition files become ‘living documentation’

VERSION CONTROL

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  - *"Does this instance have all the features I expect?"*
  - *"Is this instance configured for its role correctly?"*

BUILD PIPELINES

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- Packer supports building machine images

AUTOMATED TESTING

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```
describe service('apache2'), :if => os[:family] == 'ubuntu' do
  it { should be_enabled }
  it { should be_running }
end

describe service('org.apache.httpd'), :if => os[:family] == 'darwin' do
  it { should be_enabled }
  it { should be_running }
end

describe port(80) do
  it { should be_listening }
end
```

CONTINUOUS DELIVERY

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- Being able to update Test / Lab environments regularly

CONTINUOUS DELIVERY

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- Being able to update Test / Lab environments regularly
- Risk increases with ‘Time Since Last Success’

CODE ANALYSIS

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- Config management declarative languages have ‘lint’ tools

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FC045: Metadata does not contain cookbook name

`correctness` `metadata` `chef12`

This warning is shown when your cookbook does not define a name within the cookbook `meta`
breakage if the name of the containing directory changes. Additionally, Chef 12 requires the nan

Metadata without the name attribute

This example matches the FC045 because it lacks the name property

```
# Don't do this
maintainer 'The Authors'
maintainer_email 'you@example.com'
license 'All Rights Reserved'
description 'Installs/Configures test'
long_description 'Installs/Configures test'
version '0.1.0'
```

Kief Morris

"A NETFLIX TEAM KNEW THAT A PERCENTAGE OF AWS INSTANCES, WHEN PROVISIONED, WILL PERFORM MUCH WORSE THAN THE AVERAGE INSTANCE SO THEY WROTE THEIR PROVISIONING SCRIPTS TO IMMEDIATELY TEST THE PERFORMANCE OF EACH NEW INSTANCE. IF IT DOESN'T MEET THEIR STANDARDS, THE SCRIPT DESTROYS THE INSTANCE AND TRIES AGAIN WITH A NEW INSTANCE."

Kief Morris

HIGH PERFORMING ORGANISATIONS

@jbjon

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- have better employee loyalty
- spend **22%** less time on unplanned work and rework

@jbjon

5 STAGES OF DEVOPS EVOLUTION

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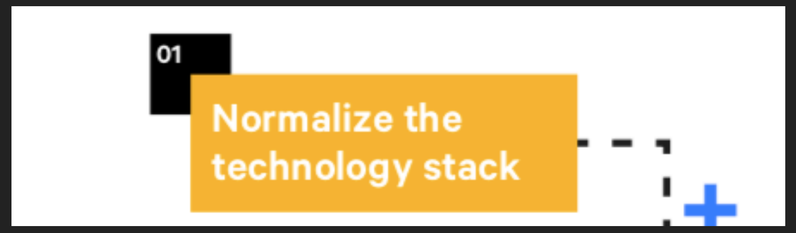

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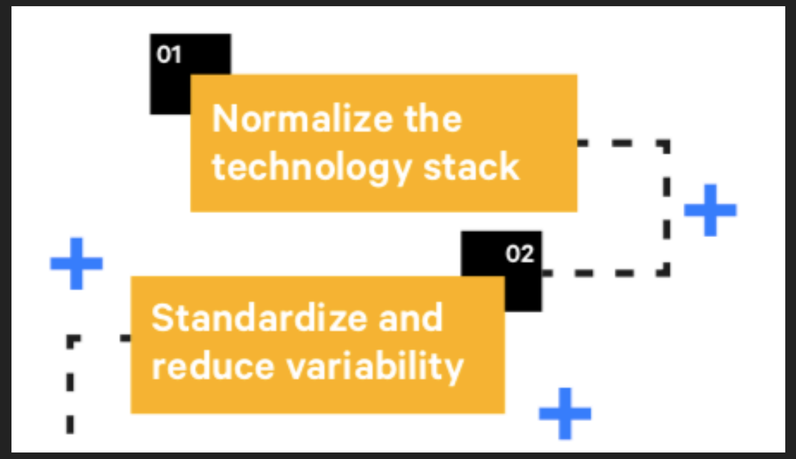

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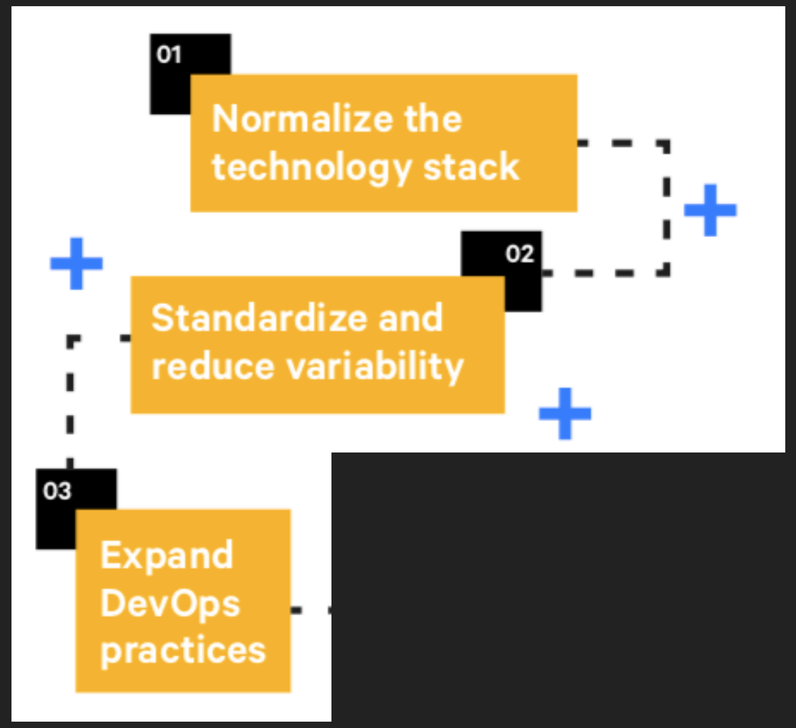

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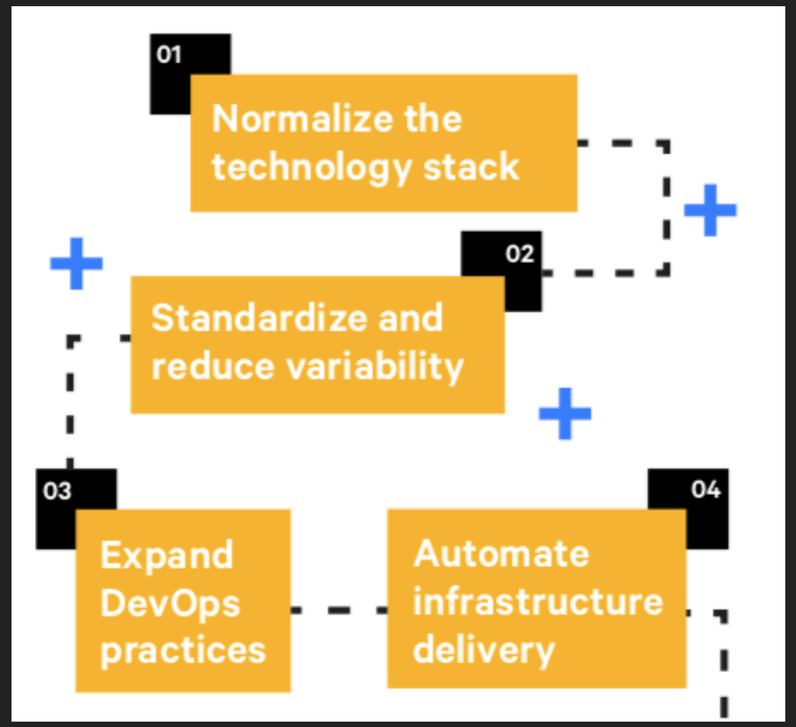

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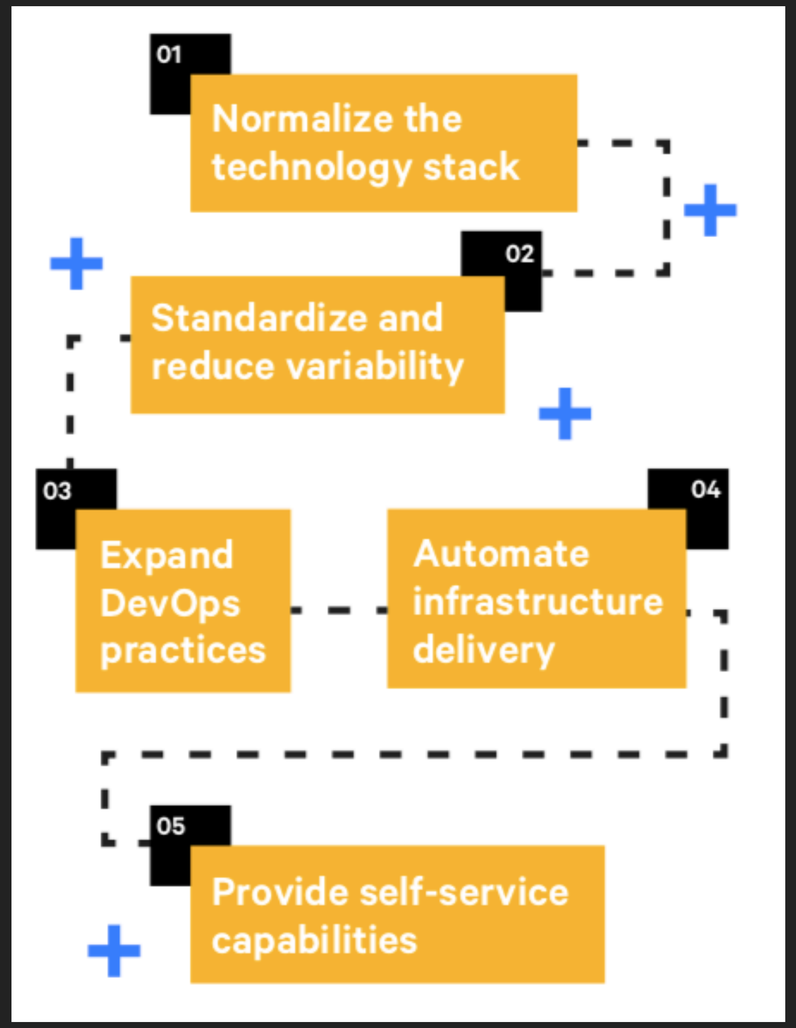

@jbjon

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- Test the changes in a safe environment
- Monitor all the things

AGILE ENGINEERING
WORKS WHEN WE SHARE WHAT WORKS, INTRODUCE CONSISTENCY AND COLLABORATE


แบบหัดอ่าน A B C สำหรับเด็ก


QUESTIONS?

ABOUT ME

- **Jonathan Relf**
- Solutions Architect @ Commify
- about.me/jbjon

@jbjon