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From Creepers to Clusters: Evolving Minecraft into a Cloud Native Platform

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Who are we?



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MINECRAFT

JAVA EDITION

Falling off cliffs!

Singleplayer

Multiplayer

Minecraft Realms



Options...

Quit Game





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2012 - The beginning of CubeCraft





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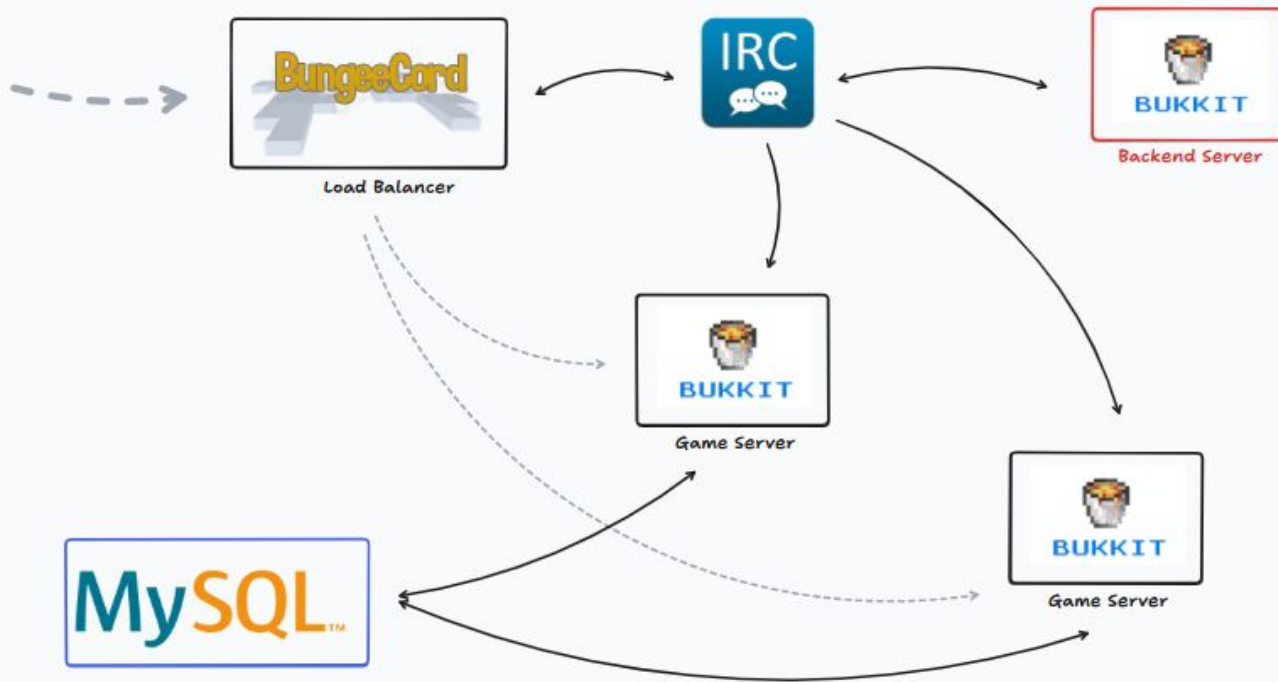


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We had to grow fast





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2016 - Scaling pain





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“We Need Microservices”

Break apart existing monolith (into separate Spring boot apps)

Implement a proper server orchestrator

Eliminate the single point of failure





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Breaking apart the monolith

... it took us 4 years!





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2020 - The big success?





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No



What the 2016 pivot taught us



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The overarching lesson: Retiring a monolith is necessary, but not sufficient without a platform underneath

Led to a distributed and disjoint mess of random services

What we *needed* was a platform capable of actually running, discovering and scaling those services



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Determined to get it right



A new starting point



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Taking a platform-first approach

- What platform do we need to run our services and workloads well?
- Are we just solving this for ourselves?
- What tools are available to help us achieve this?

Getting the foundation right before building

What are we solving



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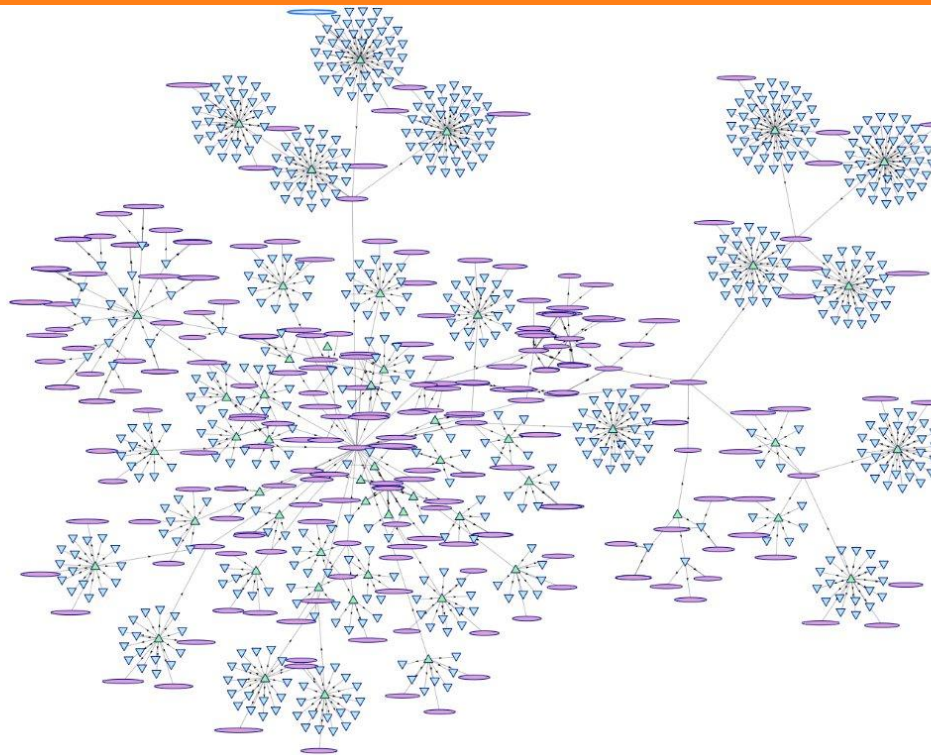


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Minecraft is challenging to scale

- Players from all over the world
- PvP - latency sensitive
- Lots of network attacks
- Large amount of dependencies
(configs, pre-made worlds, plugins, ...)



What are we solving



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Traditional scaling problems

- Lots of bandwidth
- Lots of compute (both RAM and CPU intensive)
- Lots of player data (stats, leaderboards, player worlds ...)
- Lots of features (in-game, APIs, web panels)





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The Rocket Platform





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**CubeCraft became a user
of the platform**

Rocket Platform Overview



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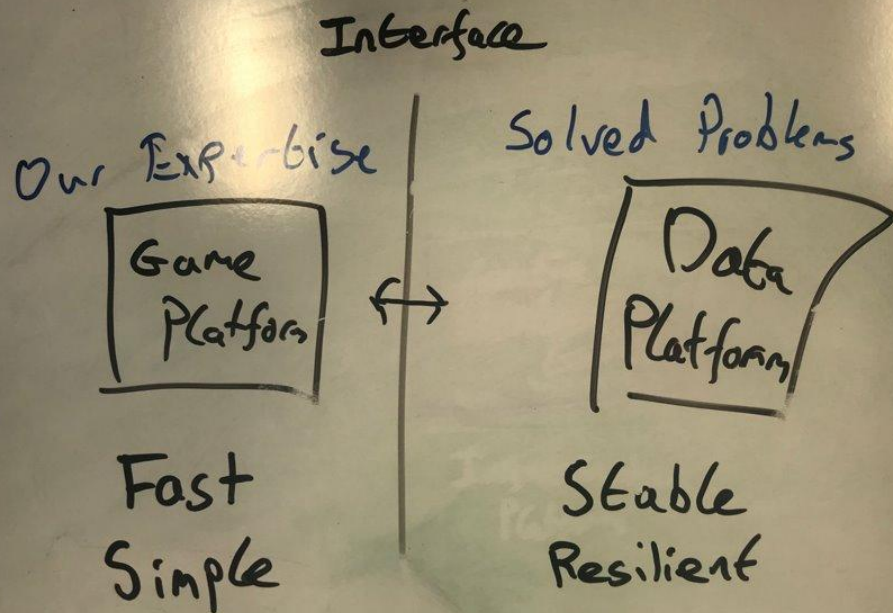
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Game Platform

- Runs the game workloads
- Cloud and bare metal
- Metrics & Observability

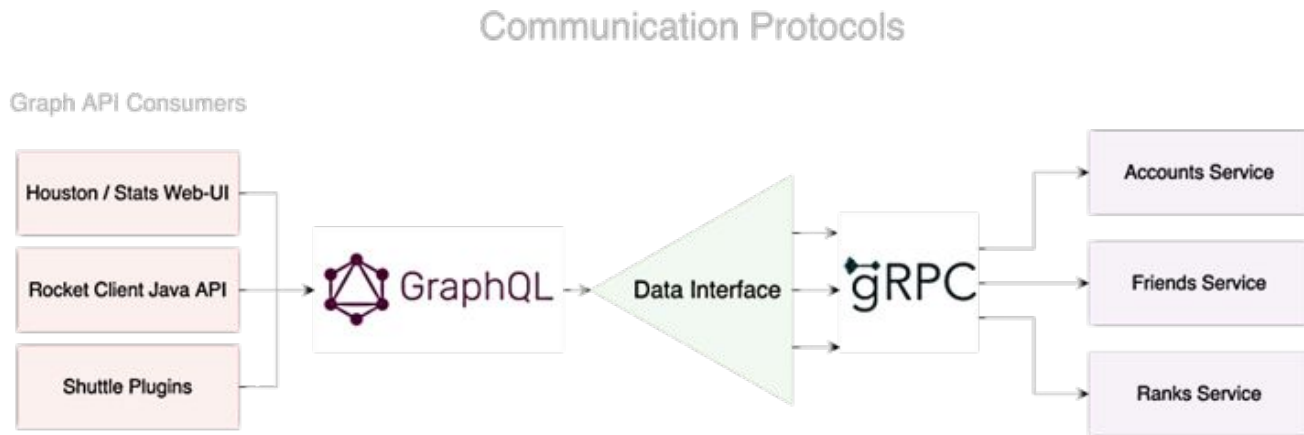
Data Platform

- Supporting services
- Matchmaking
- Social features - parties, ...
- Data storage - inventories, worlds, ...



Rocket Data Platform

- Client connects to GraphQL gateway
- gRPC used internally



Rocket Game Platform

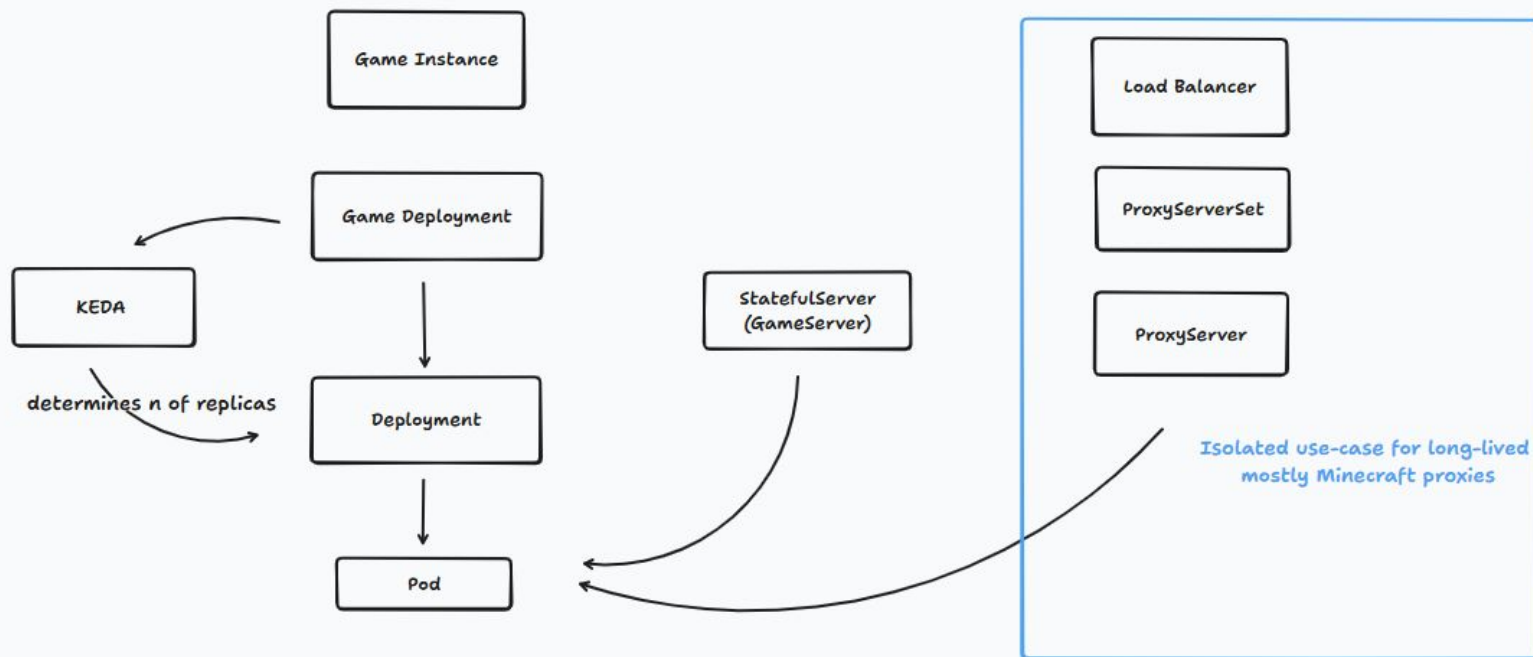


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Tools - what can we use?



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EXPLORE

GUIDE

STATS

Type / to search items



Filters

GROUP:

Projects and products

Members

Certified partners and providers

Serverless

Wasm

CNAI

VIEW MODE

Grid

Card

Zoom

-

+

Application Definition & Image Build

CNCF GRADUATED

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Continuous Integration & Delivery

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API Gateway

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Remote Procedure Call

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Quarkus

"Supersonic Subatomic Java" - Designed to run in Kubernetes



Project: coolstore-microservices Application: all applications

DC web-ui

Overview Resources

Pods

- web-ui-1-bnx6x Run

Builds

- web-ui
- Build #1 is complete (8 days ago)

Services

- web-ui
- Service port: 8080-tcp → Pod Port: 8080

Welcome to Rancher

Learn more about the improvements and new capabilities in this version.

Getting Started

Take a look at the quick getting started guide. For Cluster Manager users, learn more about where you can find your favorite features in the Dashboard UI. [Learn More](#)

You can change what you see when you login via preferences [Preferences](#)

Community Support

[Docs](#)
[Forums](#)
[Slack](#)
[File an Issue](#)

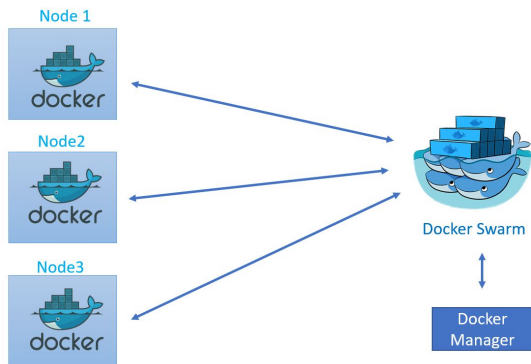
Commercial Support

[Learn about commercial support](#)

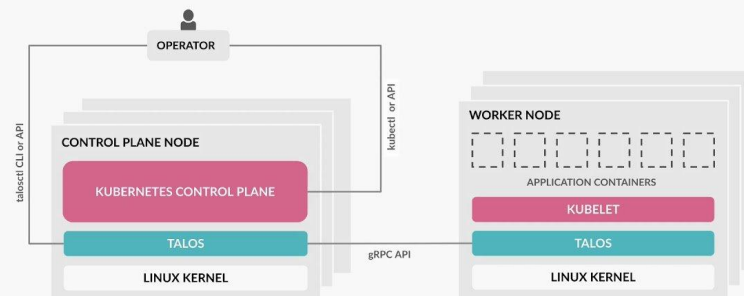
Clusters 30 Import Existing Create Filter

State	Name	Provider	Kubernetes Version	CPU	Memory	Pods
Active		gke	v1.23.8-gke.1900	1.88 cores	5.49 GiB	38/220
Active		eks	v1.22.15-eks-fb459a0	13.63 cores	22 GiB	77/127
Active		gke	v1.23.8-gke.1900	2.82 cores	8.24 GiB	40/330

Docker Swarm Architecture



What's Talos?





So what does that mean exactly?

Cloud buzzwords, right? In short, OKD is a very opinionated deployment of *Kubernetes*. Kubernetes is a collection of software and design patterns to operate applications at scale.

We add some features directly as modifications into Kubernetes, but mostly we augment the platform by "preinstalling" a large amount of pieces of software called "Operators" into the deployed cluster.

These operators then provide all of our cluster components (over 100 of them!) which make up the platform, such as OS upgrades, web consoles, monitoring and image building

[Go to Docs](#)



In-cloud or on-prem

OKD is intended to be run at all scales from cloud to metal to edge. The installer is fully automated on some platforms (such as AWS), or supports configuration into custom environments (such as metal or labs).



Opinionated

The cloud landscape is vast. From GitOps to Service Meshes, Virtualisation to Storage, OKD integrated deployments of leading projects. Recommended Design Patterns enhance security posture and defaults include hardened configuration



Emerging Technologies

OKD adopts developing best practise and technology. A great platform for technologists and students to learn, experiment and contribute across the cloud ecosystem. For OpenShift contributors and partners our technical similarity makes us an ideal lab and development environemnt.



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“Vanilla” Kubernetes wasn’t enough



Tuning K8s for games



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SR-IOV attaching public interfaces in bare metal

- Overlay/CNI networks slow
- Using Multus to attach secondary networks
- Allow game traffic to flow over “metal”
- No need for meshes or overlays
- Managed same as any other bare metal server

ZRAM to improve node density

- In-memory swap (compressed)
- A large portion of data in RAM is repetitive
- Actively used on legacy infrastructure
- K8s is slowly getting there



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Where We Are Now



The architecture today

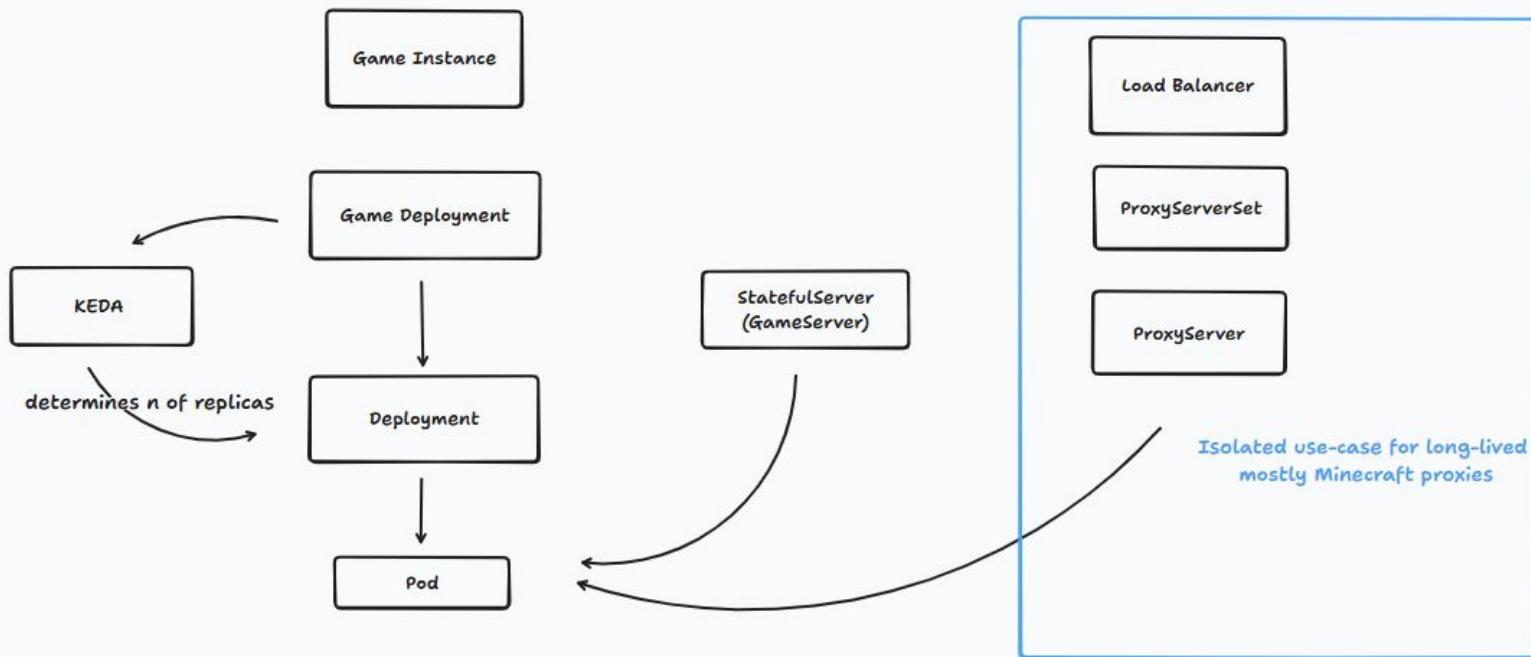


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The architecture today



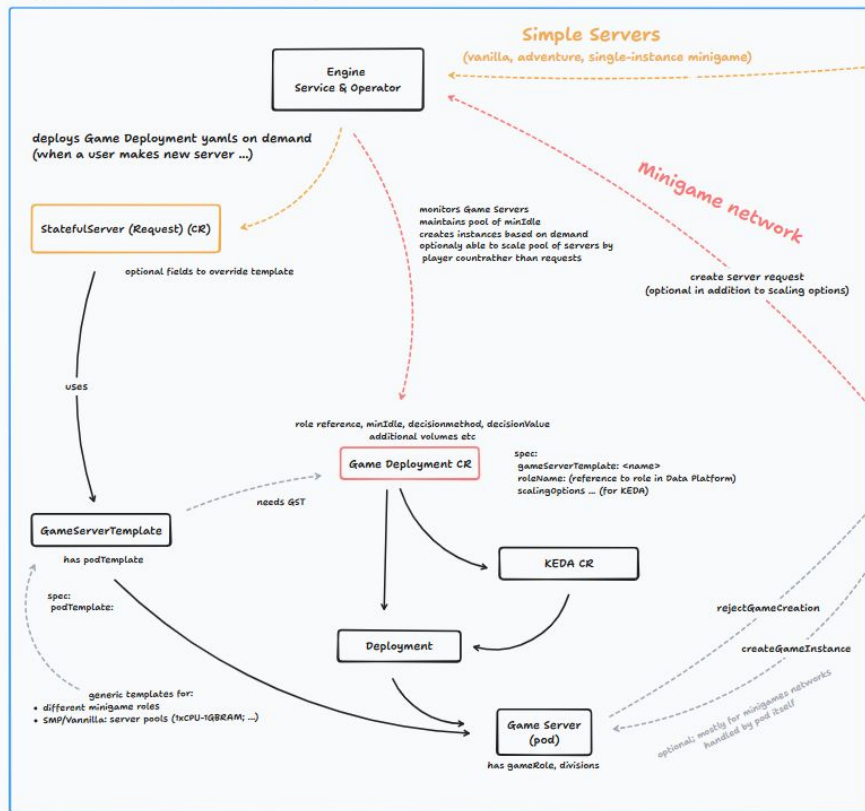
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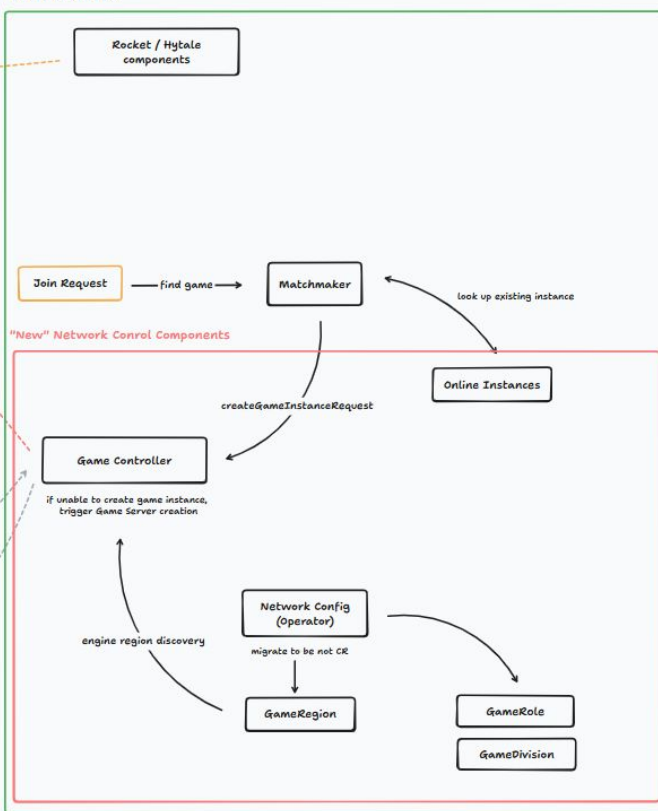
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Regional Cluster / Engine Namespace



Data Cluster



We did deploy stuff - Data Platform



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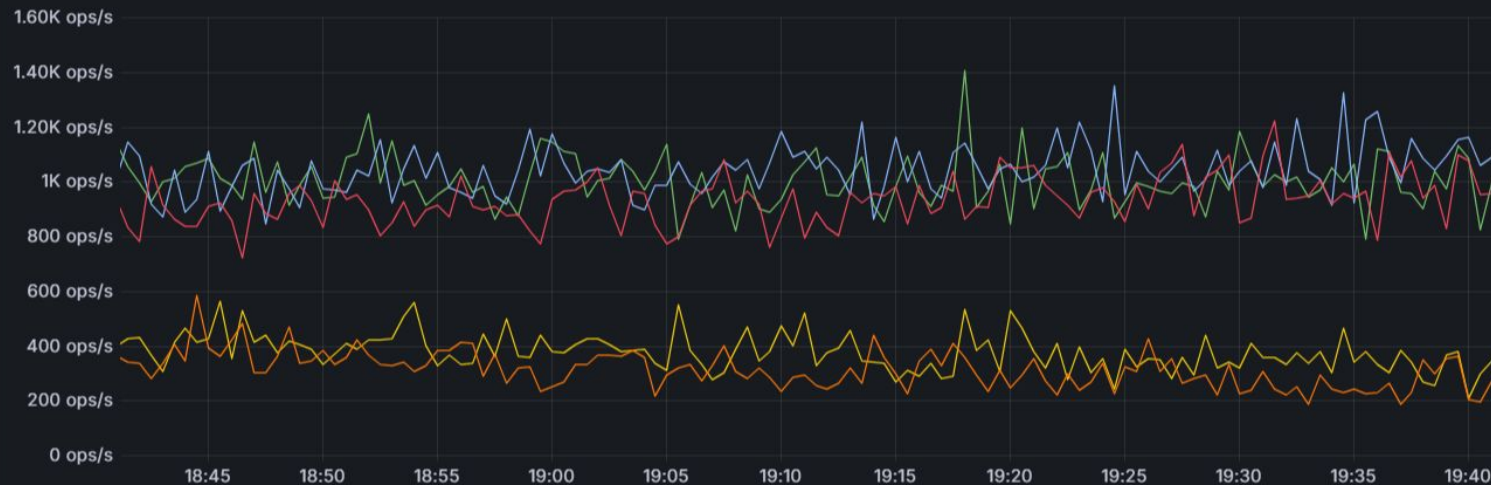


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- Successfully deployed Data Platform
- ~5K GQL queries per second
from 1,600 online instances (game servers)
- 16TB of player data in MongoDB

GraphQL Query Count



We did deploy stuff - Games



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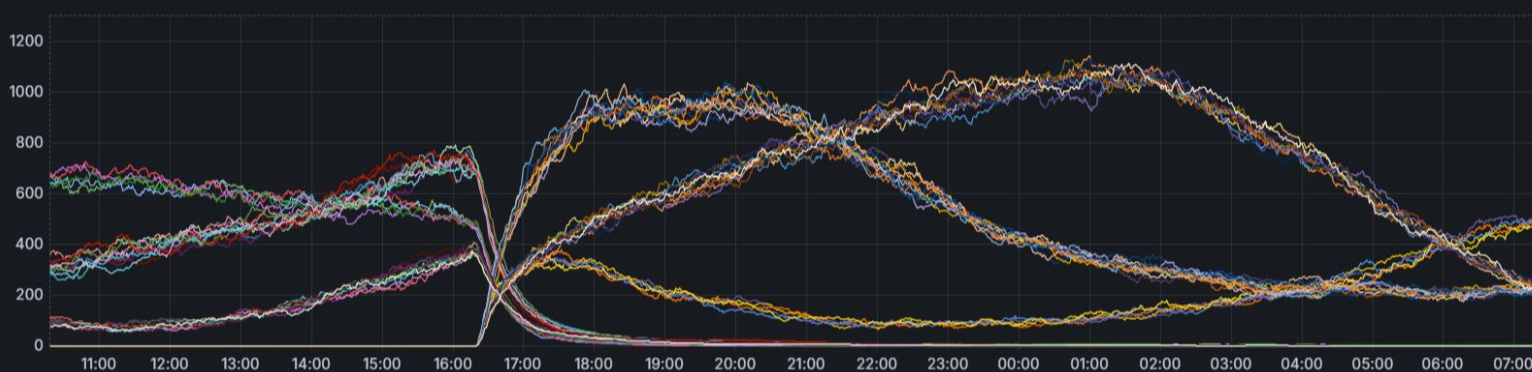
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RCKT Players By Bungee - Bedrock



Players By Bungee - Bedrock



CubeCraft as the flagship client



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CubeCraft as the primary “client” of the Rocket platform

- Tension between hypotheticals and what is actually needed
- Building tech that scales, right away

Difficulties

- Maintaining an agnostic design
- Deciding what CubeCraft needs vs what Rocket needs

New tenants validating the platform

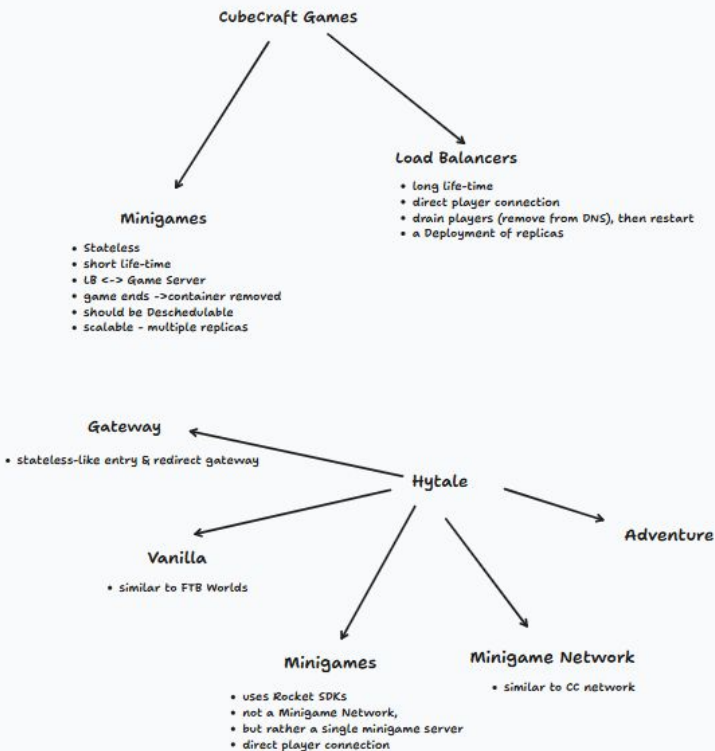
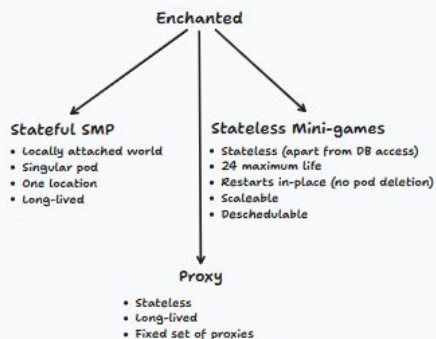


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Our Roadmap

Deploy all CubeCraft workloads to Rocket

Continue growing the platform





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Lessons Learned



Lessons Learned



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- Understand your problem first, then chose the tooling.
- Do your research. There is most likely a tool or a solution for what you need.
- Treating your internal platform as a product changes how you build it.



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Have more questions?

Feel free to reach out:

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Thanks for listening!

