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Containers for Scaling ML Deployment

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The Challenge

Software Stacks

Hardware Environments

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The Challenge

Static website

nginx 1.5 + modsecurity + openssl + bootstrap 2

User DB

postgresql + pgv8 + v8

Queue

Redis + redis-sentinel

Analytics DB

hadoop + hive + thrift + OpenJDK

Background workers

Python 3.0 + celery + pyredis + libcurl + ffmpeg + libopencv + nodejs + phantomjs

Web frontend

Ruby + Rails + sass + Unicorn

API endpoint

Python 2.7 + Flask + pyredis + celery + psycopg + postgresql-client

Hardware Environments

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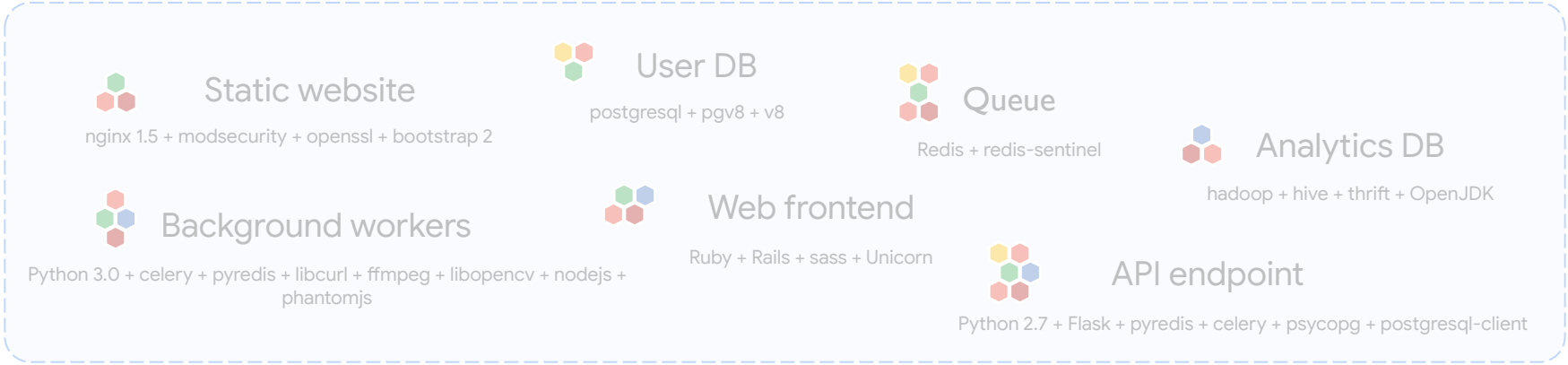
The Challenge



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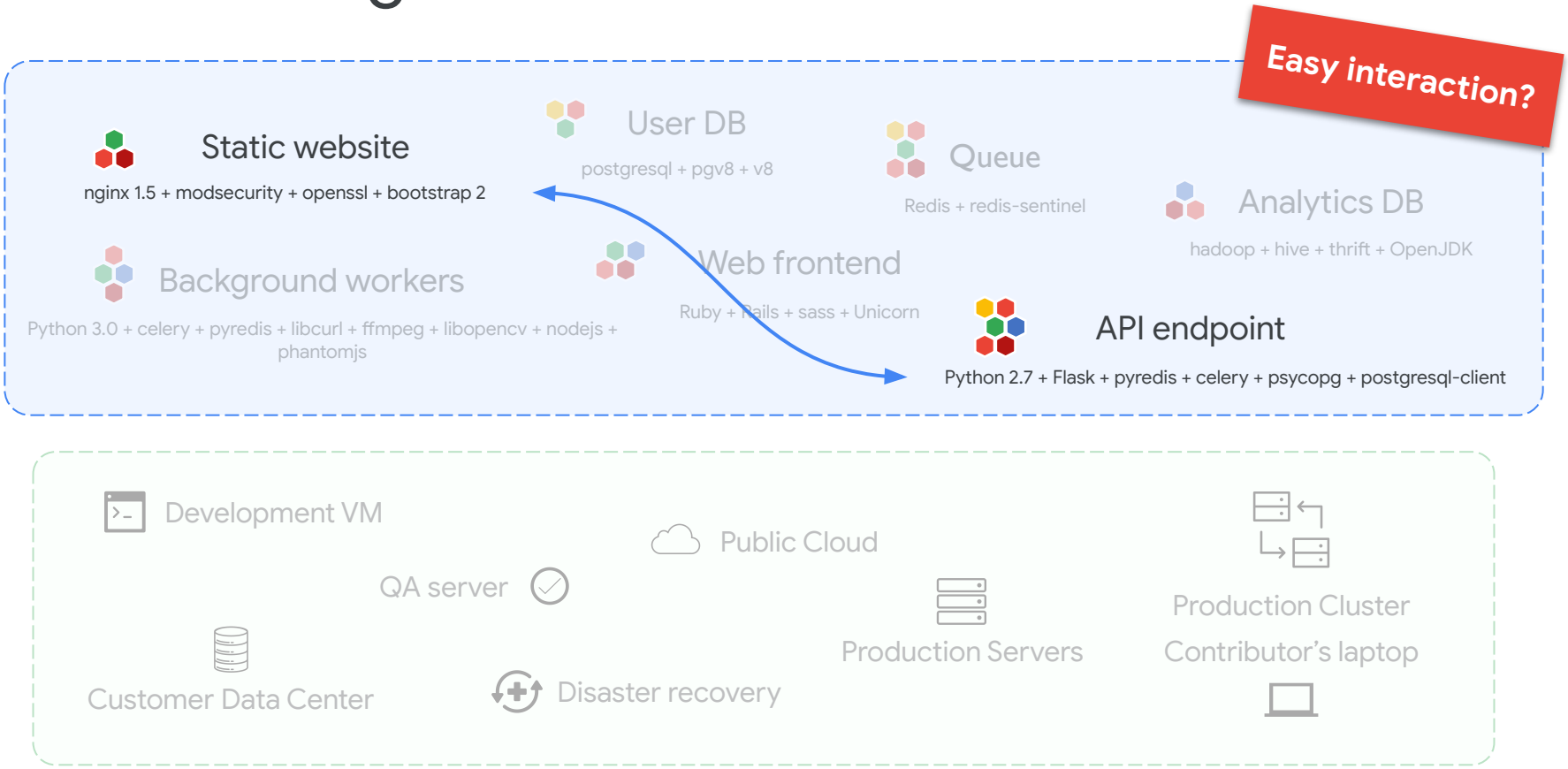
The Challenge



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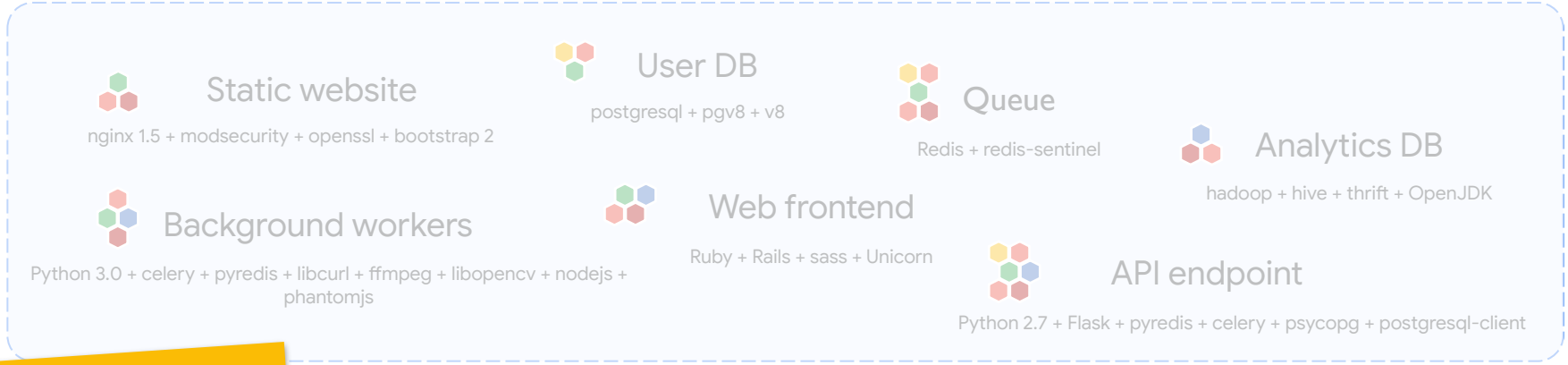

Easy migration?

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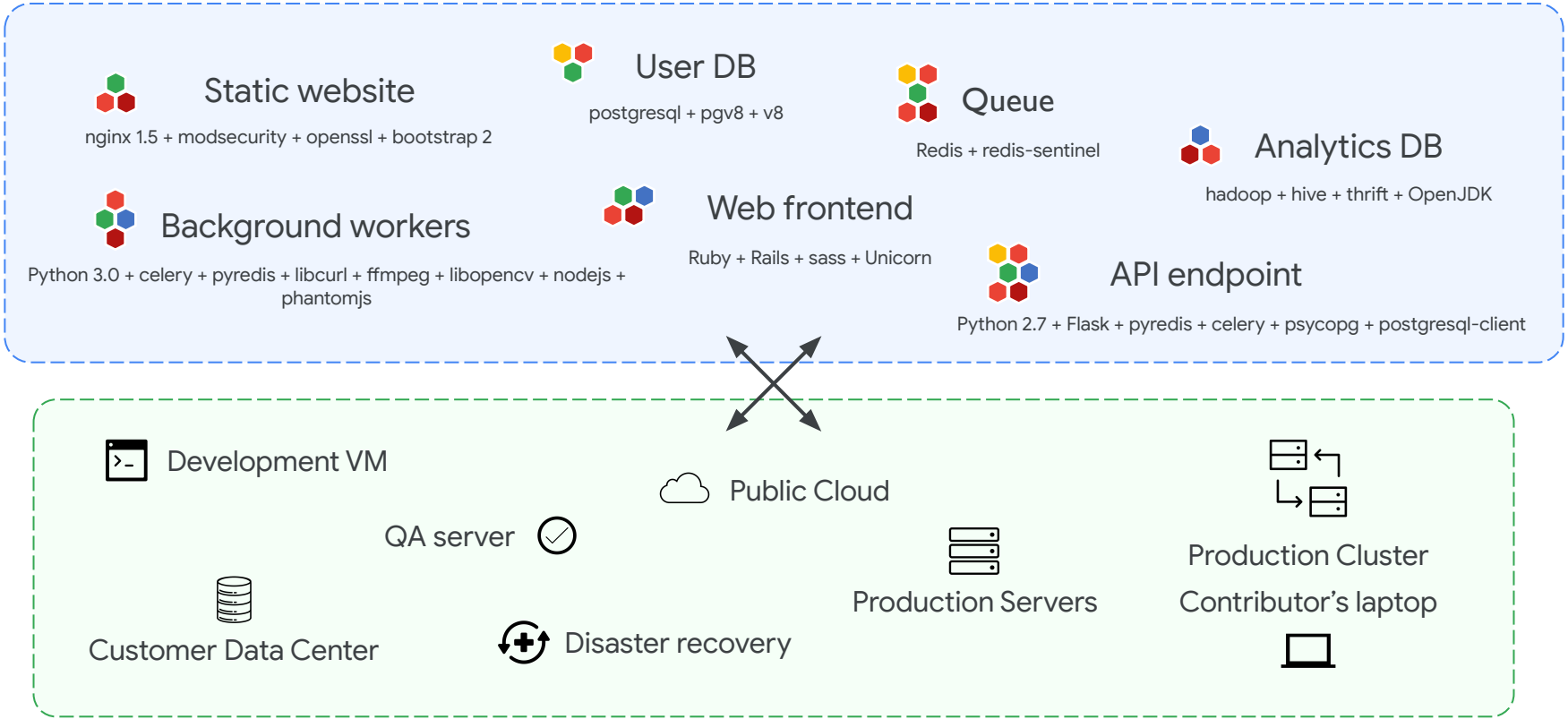
The Challenge



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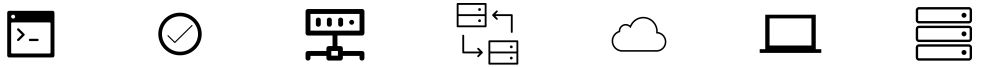
	Development VM	QA Server	Single Prod Server	Onsite Cluster	Public Cloud	Contributor's laptop	Customer Servers
Static website	?	?	?	?	?	?	?`
Web frontend	?	?	?	?	?	?	?
Background workers	?	?	?	?	?	?	?
User DB	?	?	?	?	?	?	?
Analytics DB	?	?	?	?	?	?	?
Queue	?	?	?	?	?	?	?



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Cargo Transport Pre-1960

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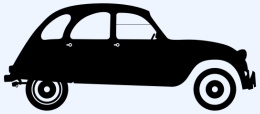
Cargo Transport Pre-1960

Goods



Transport Methods

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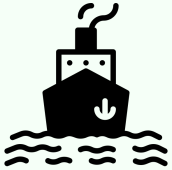
Cargo Transport Pre-1960

Goods

Transport Methods



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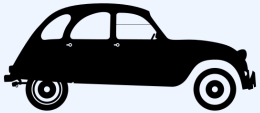
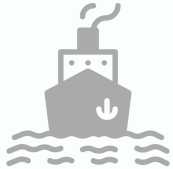
Cargo Transport Pre-1960

Bad interaction?

Goods



Transport Methods



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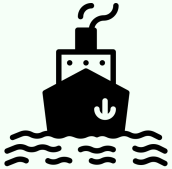
Cargo Transport Pre-1960

Goods

Easy exchange?



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	?	?	?
	?	?	?
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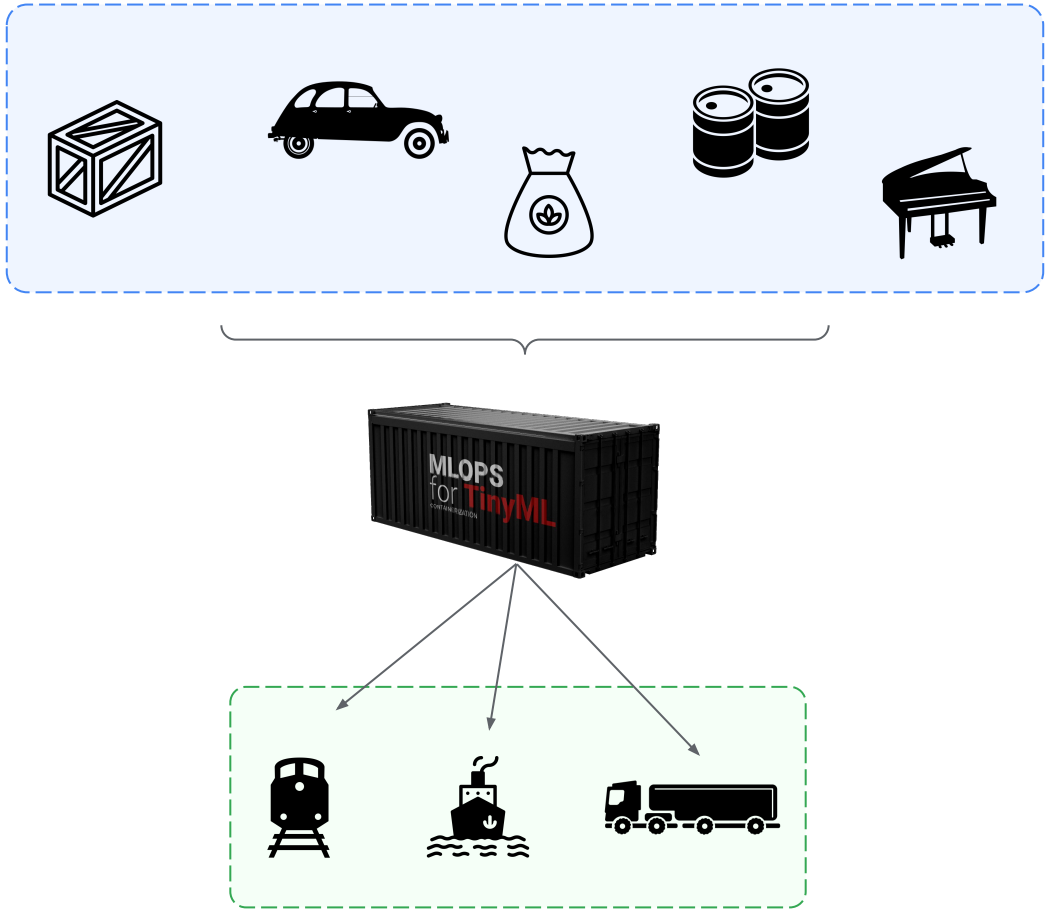

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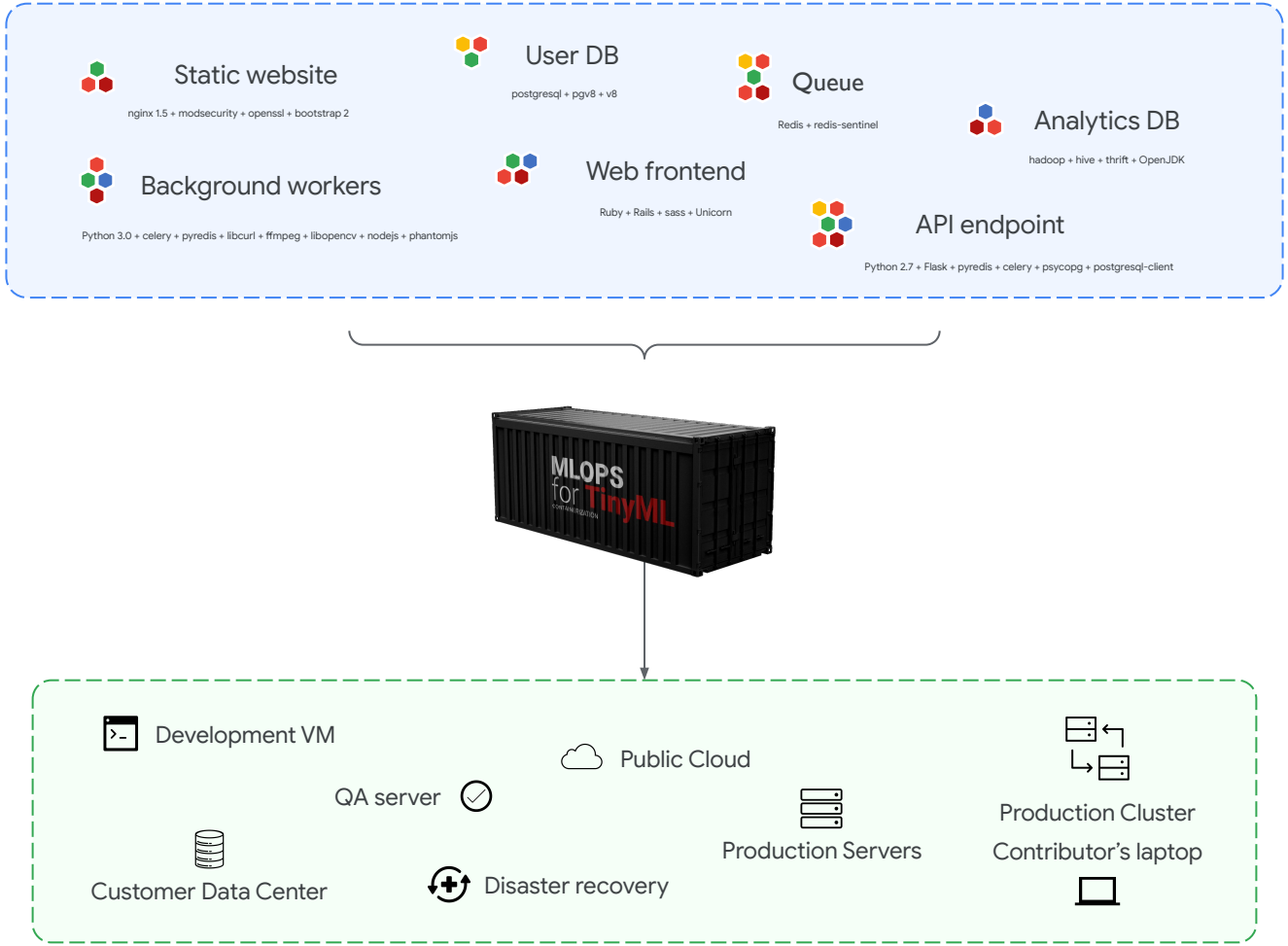

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docker

Development VM

Public Cloud

QA server

Production Cluster

Production Servers

Contributor's laptop

Customer Data Center

Disaster recovery

- Lightweight, open, secure platform

- Lightweight, open, secure platform
- **Simplify building, shipping, running apps**

- Lightweight, open, secure platform
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- **Runs natively on Linux or Windows Server**

- Lightweight, open, secure platform
- Simplify building, shipping, running apps
- Runs natively on Linux or Windows Server
- **Supports development & server environments**

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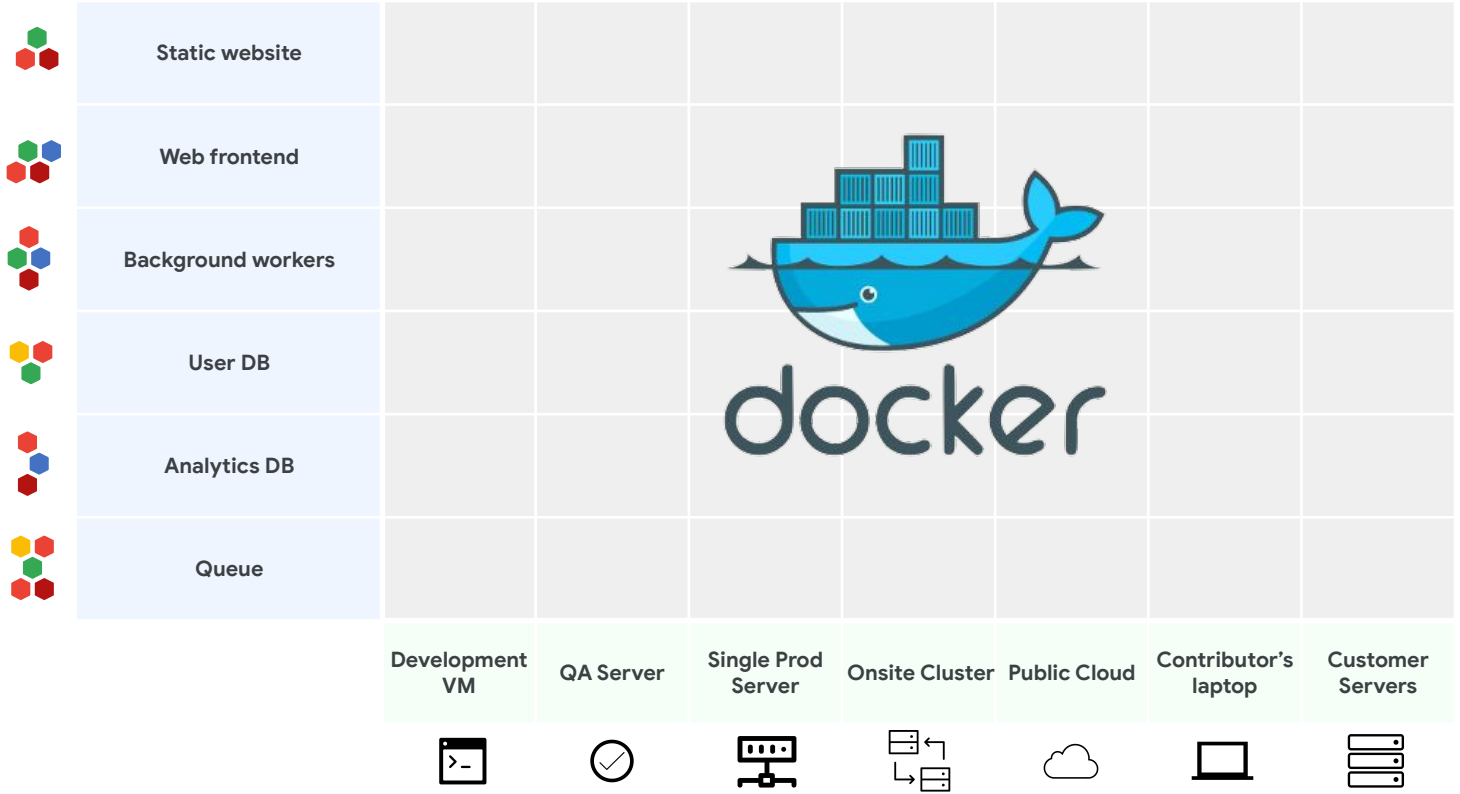

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The Role of Images and Containers

Example:
Ubuntu + Node.js
and Application Code

Container:
Created via image, runs application

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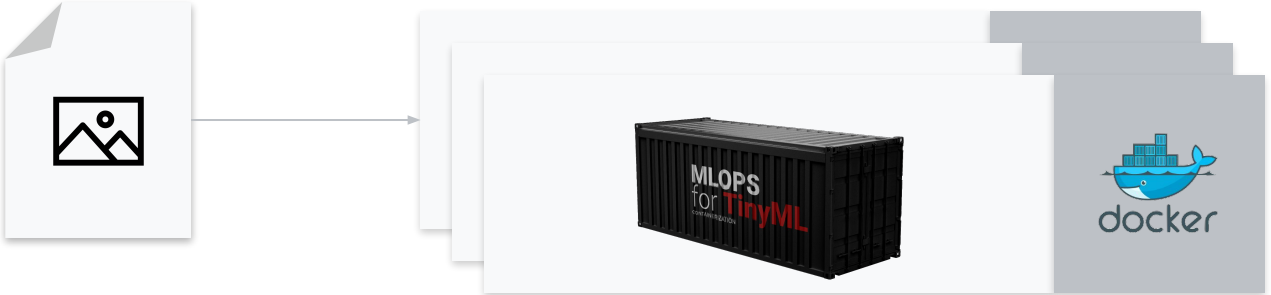
The Role of Images and Containers



Example:
Ubuntu + Node.js
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Created via image, runs application

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The MLOps **Personas**

ML Engineer

ML Researcher

Data Scientist

Data Engineer

Software Engineer

DevOps

Business Analyst

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Dana the Developer

- **Worries about what's "inside" the container**
  - code
  - libraries
  - package manager
  - apps
  - Data
- All Linux servers look the same

Software Engineer

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Dana the Developer

- **Worries about what's "inside" the container**
  - code
  - libraries
  - package manager
  - apps
  - data
- All Linux servers look the same

Software Engineer

DevOps

Oscar the Ops Guy

- **Worries about what's "outside" the container**
  - logging
  - remote access
  - monitoring
  - network config
- All containers start, stop, copy, attach, migrate, etc. the same way

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