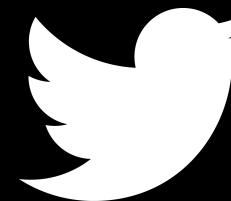


DEVOPS WEBINAR SERIES – EPISODE 1

# ENABLING BUSINESS AGILITY: DEVOPS FOR THE ENTERPRISE

 [ianmas@amazon.com](mailto:ianmas@amazon.com)

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



“The term “DevOps” typically refers to the emerging professional movement that advocates a **collaborative working relationship** between Development and IT Operations, resulting in the **fast flow of planned work** (i.e., high deploy rates), while simultaneously **increasing the reliability, stability, resilience and security of the production environment.**”

– Gene Kim

# DEVOPS INFLUENCES

AGILE  
LEAN  
KAIZEN  
THEORY OF CONSTRAINTS

The Lean Startup: How Co... +

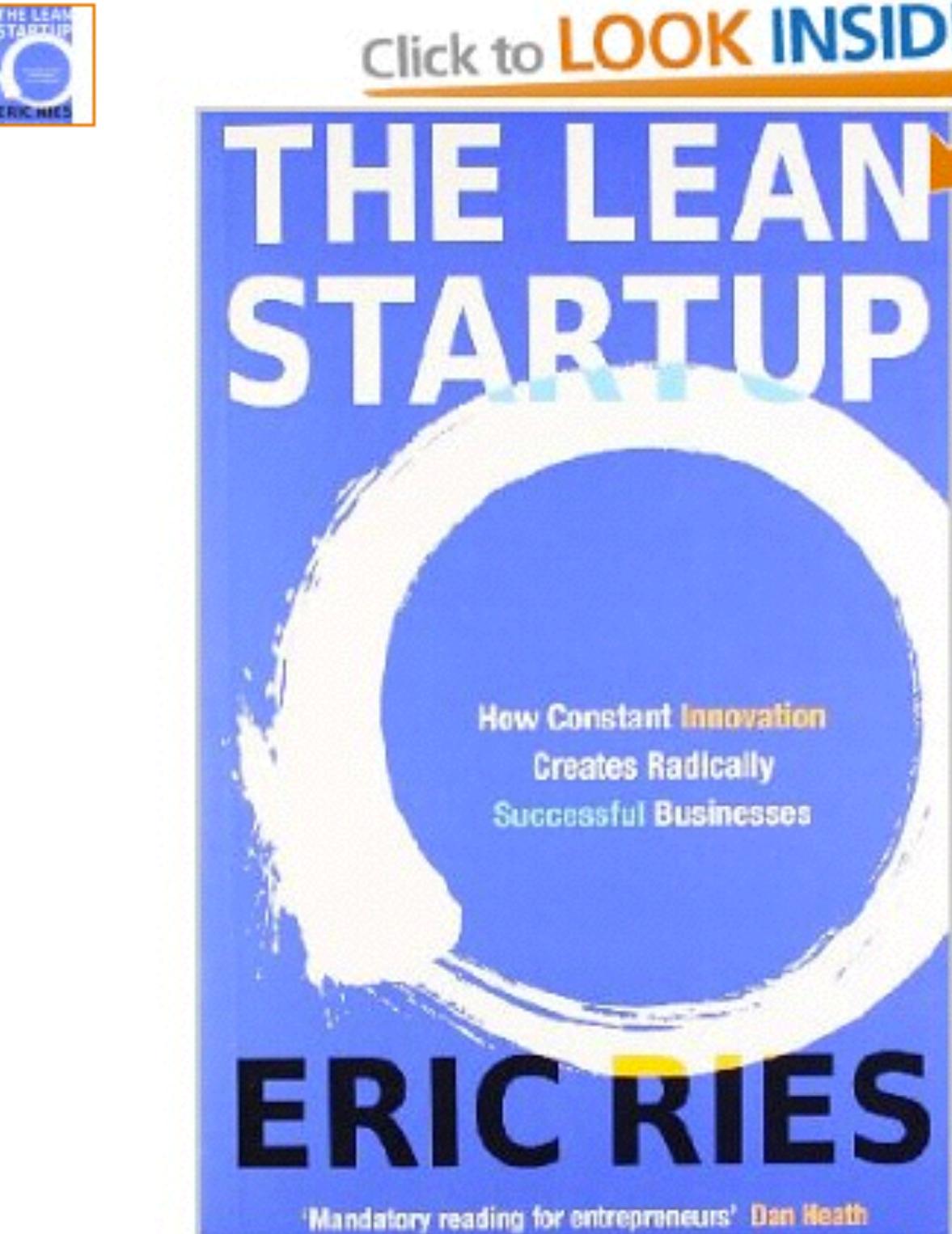
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**THE LEAN STARTUP**

How Constant Innovation Creates Radically Successful Businesses

ERIC RIES

Mandatory reading for entrepreneurs! Dan Heath

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Eric Ries (Author)

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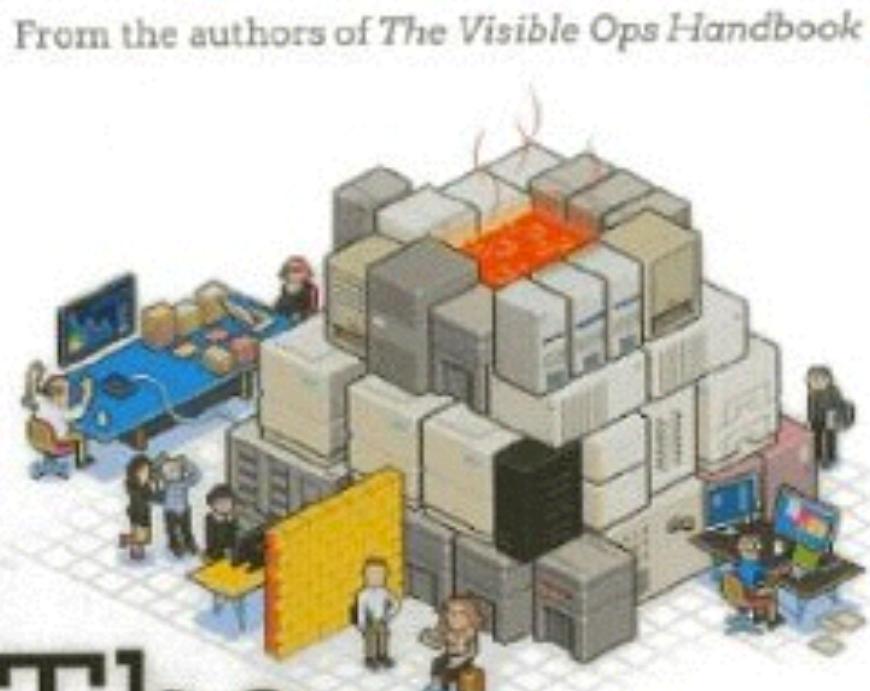
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From the authors of *The Visible Ops Handbook*



**The Phoenix Project**  
A Novel About IT, DevOps, and Helping Your Business Win  
Gene Kim, Kevin Behr, and George Spafford

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**The Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win [Hardcover]**  
Gene Kim (Author), Kevin Behr (Author), George Spafford (Author)  
★★★★★ (80 customer reviews)

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# Continuous Delivery: From dinosaur to spaceship in 2 years

Darren Hague / SAP Global IT  
February 5, 2013

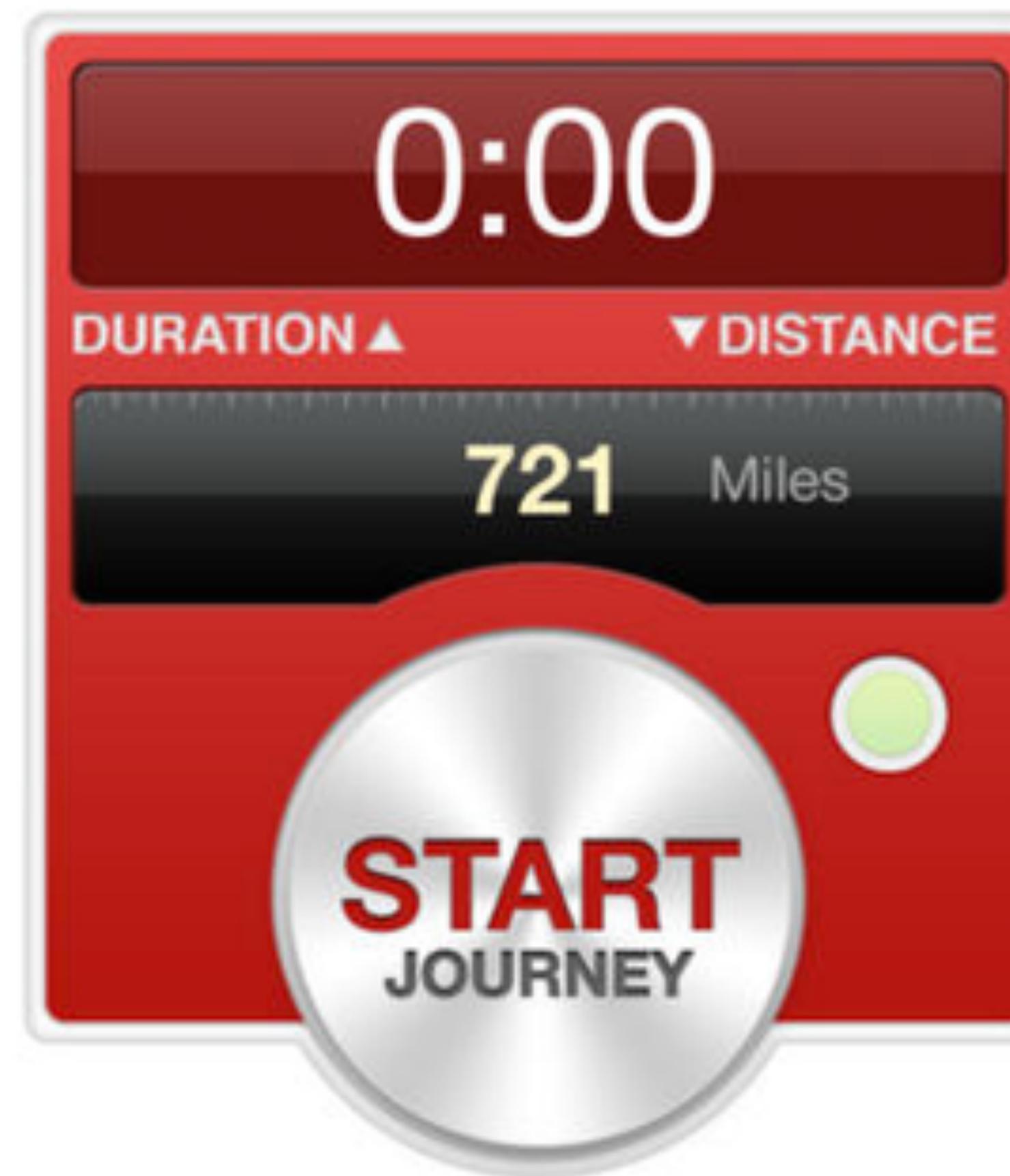
Public



# INNOVATE



# DrivePlus



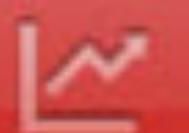
*Do not interact with the device while driving.*



Home



Journeys



Score



Help



# DrivePlus

Date	Distance	Duration	Score
21/06/2013 08:48	1.8 miles	8m	72
20/06/2013 23:07	2.2 miles	8m	72
20/06/2013 17:33	1.2 miles	0m	66
20/06/2013 09:56	0.5 miles	0m	71
20/06/2013 09:43	3.6 miles	13m	75
20/06/2013 08:37	101 miles	53m	74
19/06/2013 23:40	10.7 miles	39m	75



Home



Journeys



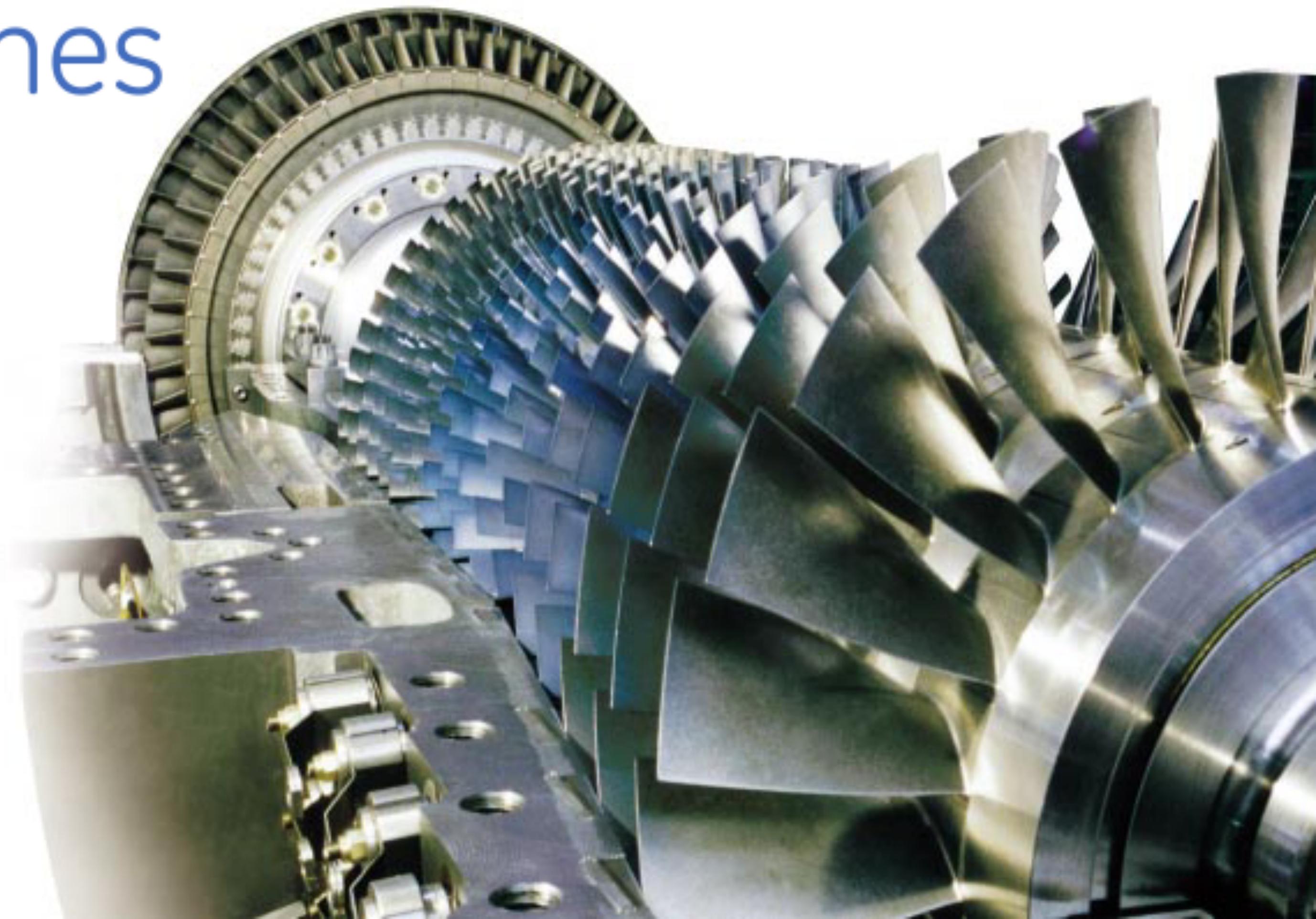
Score

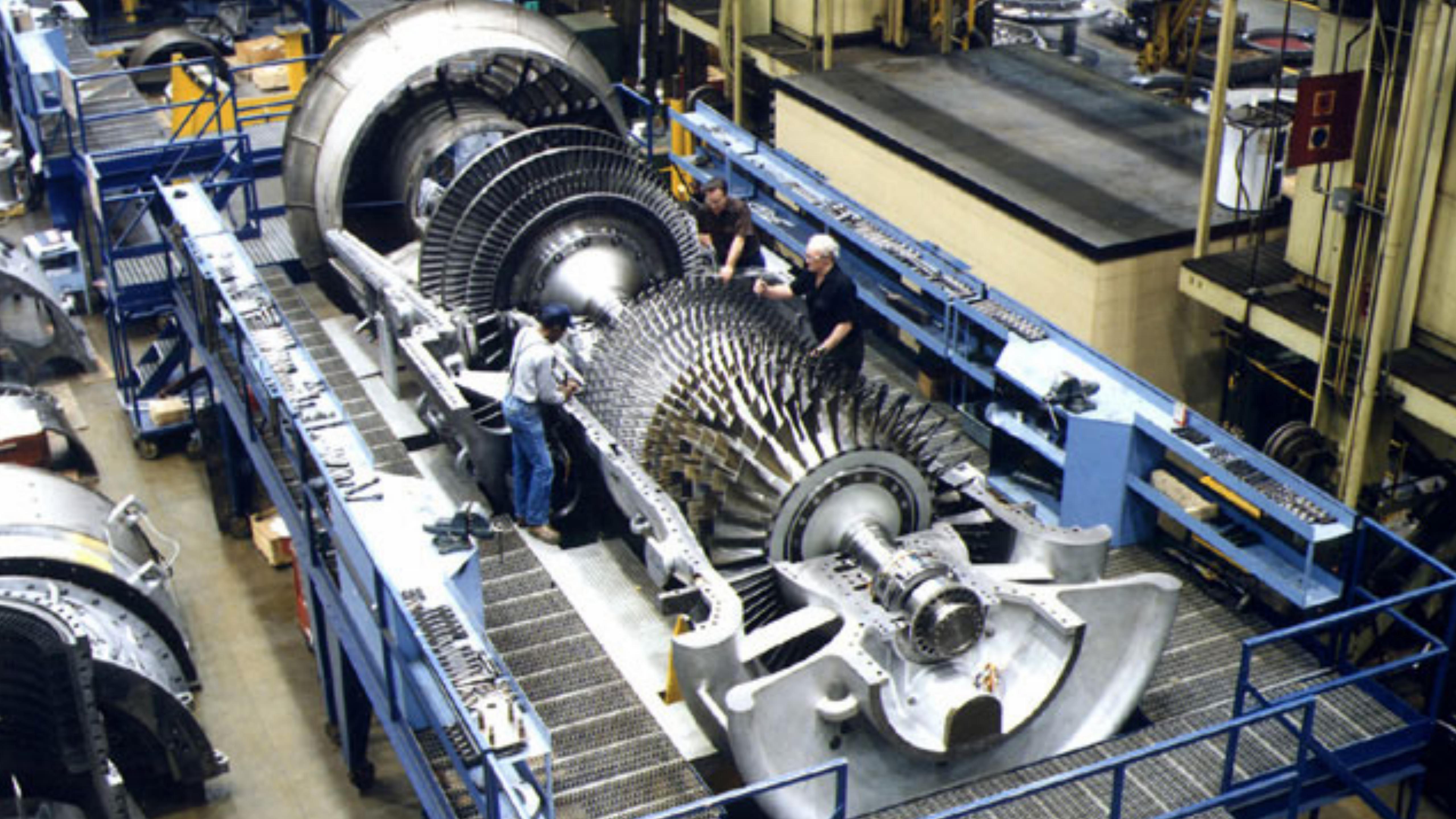


Help

GE Energy  
Oil & Gas

# Gas Turbines





INNOVATION IS HARD

« If I had asked people what they wanted,  
they would have said faster horses. »

– Henry Ford

ON-DEMAND

ELASTIC



PAY AS YOU GO



**EXPERIMENT  
FREQUENTLY**

« Want to increase innovation?  
Lower the cost of failure »

Joi Ito

**ELASTIC CAPACITY**  
+ NO CAPEX  
+ PAY AS YOU GO  
+ AVAILABLE ON-DEMAND

---

= NO RISKS



## ON-PREMISES

Experiment Infrequently  
Failure is expensive  
Less Innovation



Experiment Often  
Fail quickly at a low cost  
More Innovation



# 30+ SERVICES

The screenshot shows the AWS homepage with the navigation bar at the top. Below the navigation, there's a section titled "Products & Services" which is currently expanded. It contains several categories: "Compute", "Software", "Networking", "Content Delivery", "Database", "Payments & Billing", "Storage", "Deployment & Management", and "AWS Elastic Beanstalk". Each category has a sub-section with a title and a brief description.

- Compute**
  - Amazon Elastic Compute Cloud (EC2)**  
Amazon Elastic Compute Cloud delivers scalable, pay-as-you-go compute capacity in the cloud.
  - Amazon Elastic MapReduce**  
Amazon Elastic MapReduce is a web service that enables businesses, researchers, data analysts, and developers to easily and cost-effectively process vast amounts of data.
  - Auto Scaling**  
Auto Scaling allows you to automatically scale your Amazon EC2 capacity up or down according to conditions you define.
  - Elastic Load Balancing**  
Elastic Load Balancing automatically distributes incoming application traffic across multiple Amazon EC2 instances.
- Software**
  - AWS Marketplace**  
AWS Marketplace is an online store that helps customers find, buy, and immediately start using software that runs on the AWS cloud. It includes software from trusted vendors like SAP, Zend, Microsoft, IBM, Canonical, and 10gen as well as many widely used open source offerings including Wordpress, Drupal, and MediaWiki.
- Networking**
  - Amazon Route 53**  
Amazon Route 53 is a highly available and scalable Domain Name System (DNS) web service.
- Content Delivery**
  - Amazon CloudFront**  
Amazon CloudFront is a web service that makes it easy to distribute content with low latency via a global network of edge locations.
- Database**
  - Amazon Relational Database Service (RDS)**  
Amazon Relational Database Service is a web service that makes it easy to set up, operate, and scale a relational database in the cloud.
  - Amazon DynamoDB**  
Amazon DynamoDB is a fully-managed, high performance, NoSQL database service that is easy to set up, operate, and scale.
  - Amazon SimpleDB**  
Amazon SimpleDB is a managed NoSQL database service designed for smaller datasets.
  - Amazon ElastiCache**  
Amazon ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory cache in the cloud.
- Payments & Billing**
  - Amazon Flexible Payments Service (FPS)**  
Amazon Flexible Payments Service facilitates the digital transfer of money between any two entities, humans or computers.
  - Amazon DevPay**  
Amazon DevPay is a billing and account management service which enables developers to collect payment for their AWS applications.
- Storage**
  - Amazon Simple Storage Service (S3)**  
Amazon Simple Storage Service provides a fully redundant data storage infrastructure for storing and retrieving any amount of data, at any time, from anywhere on the Web.
  - Amazon Glacier**  
Amazon Glacier is an extremely low-cost storage service that provides secure and durable storage for data archiving and backup.
  - Amazon Elastic Block Store (EBS)**  
Amazon Elastic Block Store provides block level storage volumes for use with Amazon EC2 instances. Amazon EBS volumes are off-instance storage that persists independently from the life of an instance.
- Deployment & Management**
  - AWS Identity and Access Management (IAM)**  
IAM enables you to securely control access to AWS services and resources for your users. IAM enables you to create and manage users in AWS, and enables you to grant access to AWS resources for users managed outside of AWS in your corporate directory.
  - Amazon CloudWatch**  
Amazon CloudWatch is a web service that provides monitoring for AWS cloud resources, starting with Amazon EC2.
  - AWS Elastic Beanstalk**  
AWS Elastic Beanstalk is an even easier way to quickly deploy and manage applications in the AWS cloud. You simply upload your application, and Elastic Beanstalk automatically handles the deployment for you.
- AWS Storage Gateway**  
AWS Storage Gateway is a service connecting an on-premises software appliance with cloud-based storage to provide seamless and secure integration between an organization's on-premises IT

# **AMAZON S3**

## **SIMPLE STORAGE SERVICE**

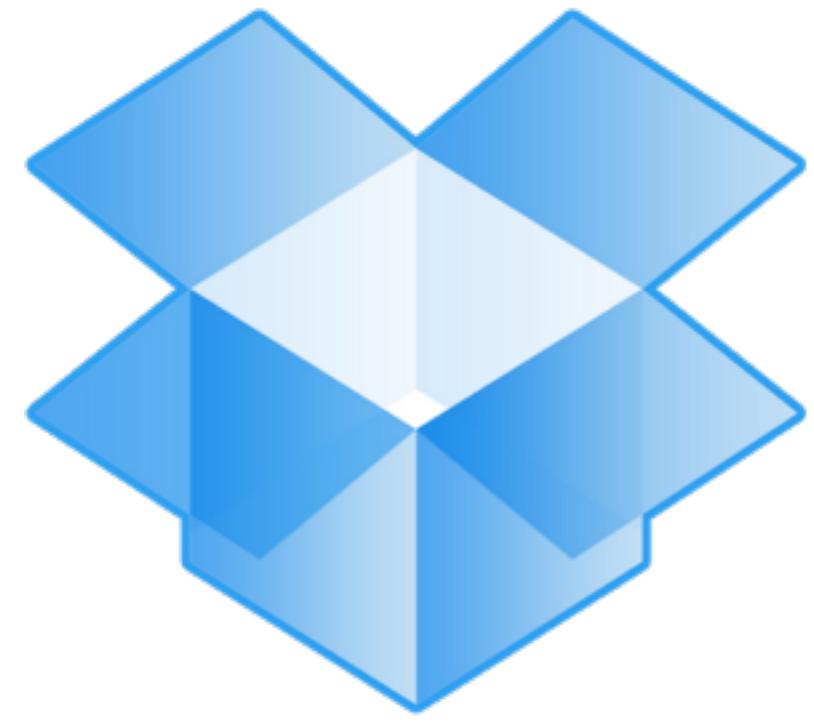
# Storage Pricing

Region:

EU (Ireland)



	Standard Storage	Reduced Redundancy Storage	Glacier Storage
First 1 TB / month	\$0.085 / GB	\$0.068 / GB	\$0.011 / GB
Next 49 TB / month	\$0.075 / GB	\$0.060 / GB	\$0.011 / GB
Next 450 TB / month	\$0.060 / GB	\$0.048 / GB	\$0.011 / GB
Next 500 TB / month	\$0.055 / GB	\$0.044 / GB	\$0.011 / GB
Next 4000 TB / month	\$0.051 / GB	\$0.041 / GB	\$0.011 / GB
Over 5000 TB / month	\$0.043 / GB	\$0.034 / GB	\$0.011 / GB



**Dropbox**

[Features](#)[Upgrade](#)[Help](#)

Carlos Conde

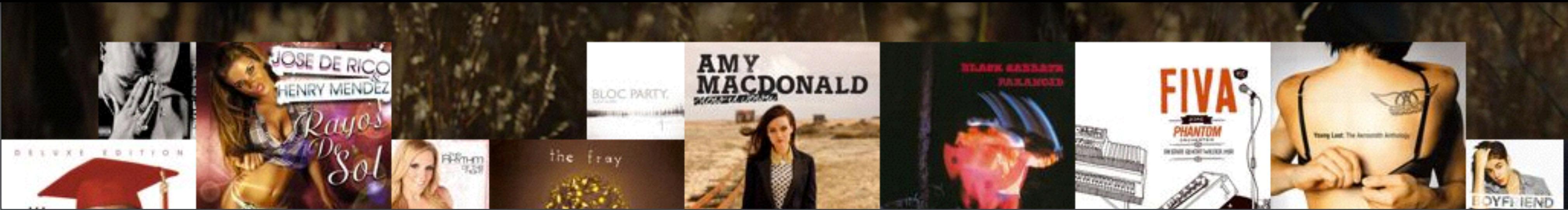
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## SPOTIFY ADDS 20,000 TRACKS/DAY TO ITS CATALOGUE



# AMAZON EC2

## ELASTIC COMPUTE CLOUD

	vCPU	ECU	Memory (GiB)	Instance Storage (GB)	Linux/UNIX Usage
<b>General Purpose - Current Generation</b>					
m3.medium	1	3	3.75	1 x 4 SSD	\$0.124 per Hour
m3.large	2	6.5	7.5	1 x 32 SSD	\$0.248 per Hour
m3.xlarge	4	13	15	2 x 40 SSD	\$0.495 per Hour
m3.2xlarge	8	26	30	2 x 80 SSD	\$0.990 per Hour
<b>General Purpose - Previous Generation</b>					
m1.small	1	1	1.7	1 x 160	\$0.065 per Hour
m1.medium	1	2	3.75	1 x 410	\$0.130 per Hour
m1.large	2	4	7.5	2 x 420	\$0.260 per Hour
m1.xlarge	4	8	15	4 x 420	\$0.520 per Hour
<b>Compute Optimized - Current Generation</b>					
c3.large	2	7	3.75	2 x 16 SSD	\$0.171 per Hour
c3.xlarge	4	14	7.5	2 x 40 SSD	\$0.342 per Hour

# GPU INSTANCES

**G2**

**1x NVIDIA Kepler GK104  
8 vCPU (Intel Xeon E5-2670)**

\$0.65/h

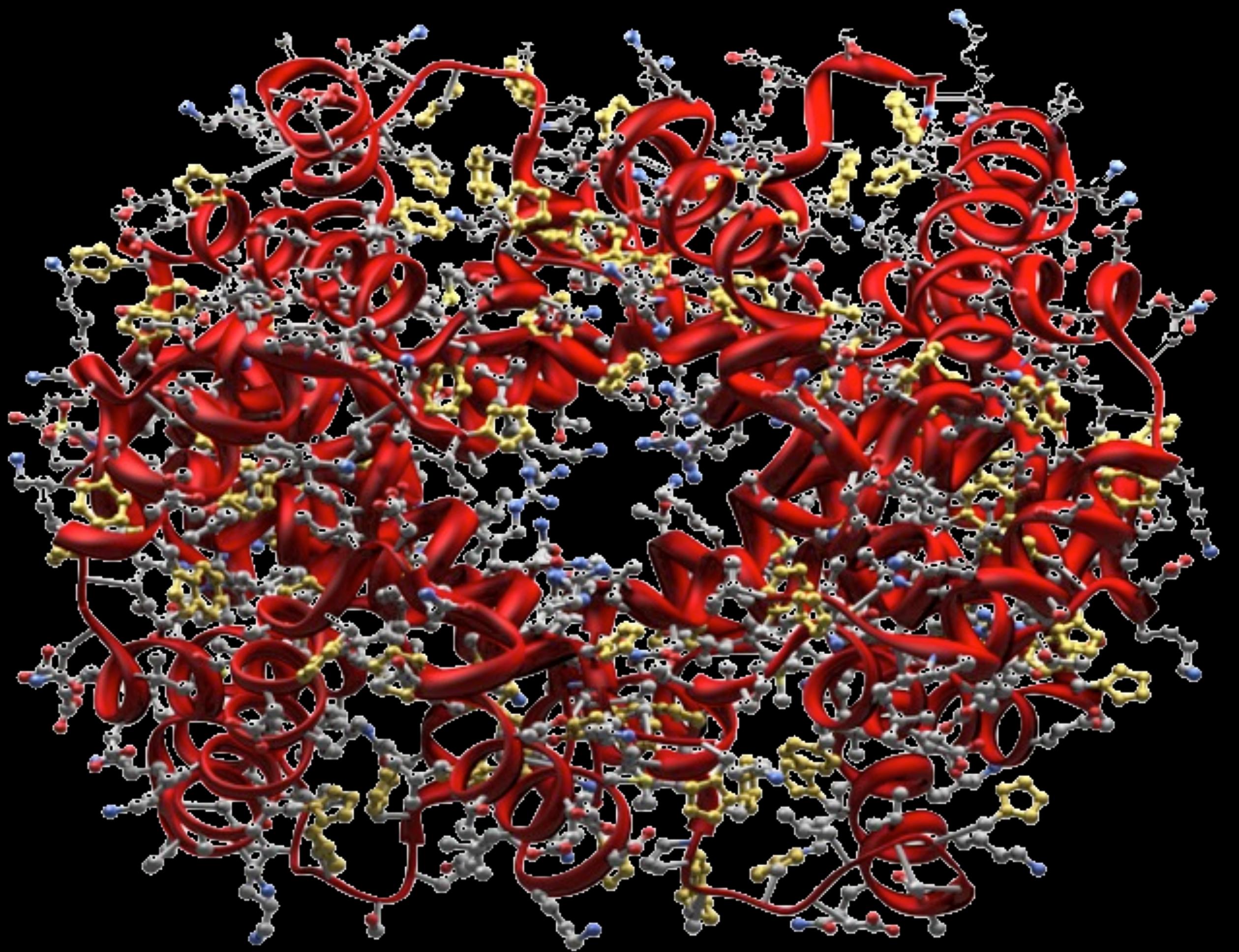
**CG1**

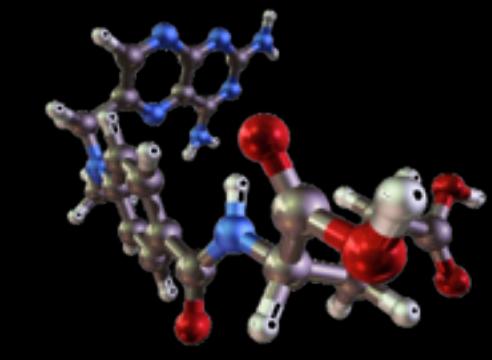
**2x NVIDIA Fermi M2050  
16 vCPU (Intel Xeon X5570)**

\$2.10/h

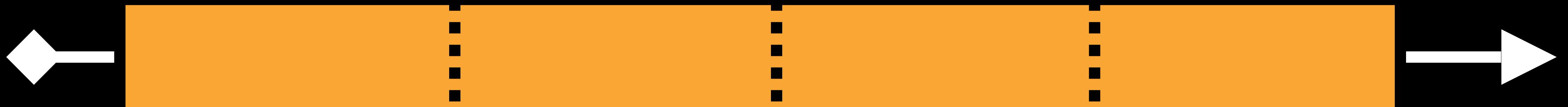


SCHRÖDINGER®





# ON A SINGLE INSTANCE



COMPUTE TIME: **4h**

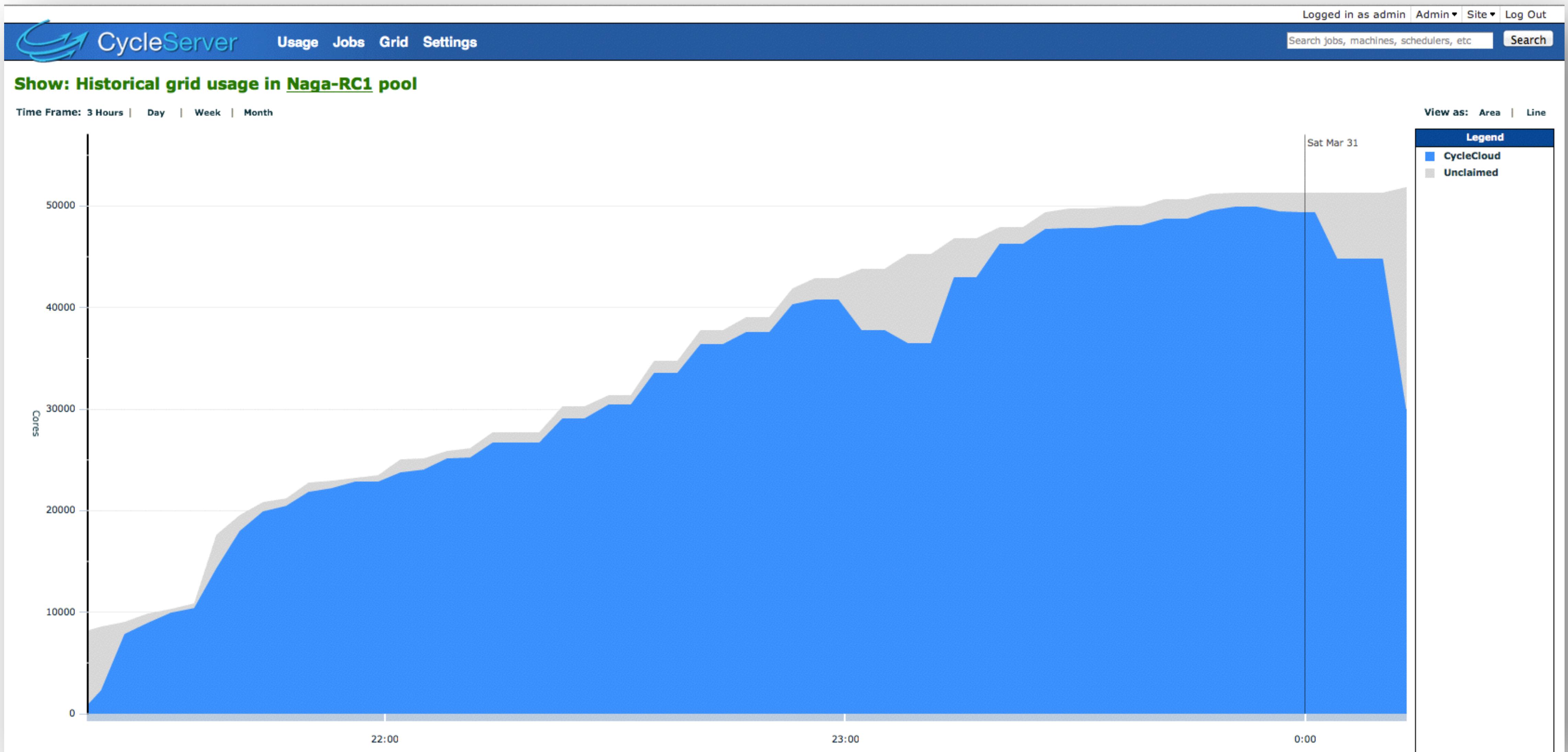
COST:  $4\text{h} \times \$2.1 = \$8.4$

# ON MULTIPLE INSTANCES



COMPUTE TIME: 1h

COST:  $1h \times 4 \times \$2.1 = \$8.4$



**3 HOURS  
FOR \$4828.85/hr**

Instead of  
**\$20+ MILLIONS**  
in infrastructure



MEASURE, IMPROVE,  
AND ITERATE

« Failure is simply the opportunity to begin again, this time more intelligently. »

– Henry Ford



# TEST ENVIRONMENTS

CASE STUDY



30,000 REQUESTS / SECOND

1 TB TRAFFIC / DAY

“...AWS seemed to be the best solution available to allow a small, independent company to **rapidly develop and test** a completely new infrastructure, and host it.

We also loved the **flexibility** that AWS allowed us, when **spinning up** smaller test environments, for beta trials, QA, localization, and during development. The **low initial cost** was also crucial.”



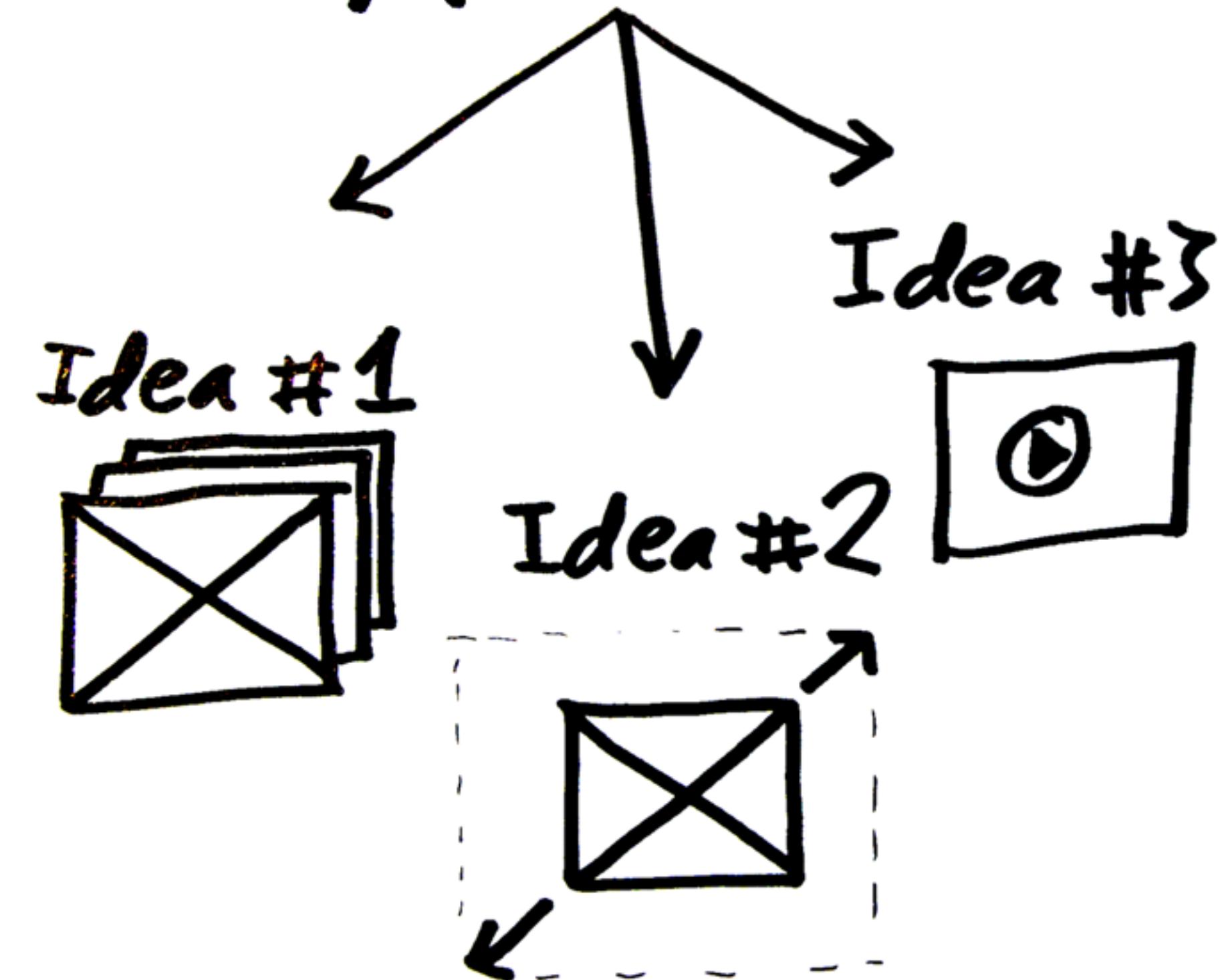
*Alex Evans, CTO*

# A / B TESTING

Problem



Hypothesis



A screenshot of the Amazon.com homepage as it would appear in Microsoft Internet Explorer. The top navigation bar includes links for File, Edit, View, Favorites, Tools, Help, and various bookmarks like 'The QED Publishing Inno...', 'LOYOLA PRESS A Jesuit M...', 'Code Charts', 'Validate EPUB documents...', 'MSN.com', 'Welcome to Facebook', and 'Fighting Complexity in EP...'. The main content features a large 'Kindle' advertisement with a price of \$114, a 'Clothing Trends' section for the Fall, and a sidebar for 'More Items to Consider' showing books on Biblical Hebrew grammar. On the right, there's a promotional banner for 'Bounty' paper towels and another for the 'Microsoft Touch Mouse'. The bottom of the screen shows the Windows taskbar with icons for Internet Explorer, File Explorer, Firefox, and others.

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www.amazon.com/ref=gno\_logo

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Movies, Music & Games  
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**11.6s**

Mean time between  
deployments  
(weekday)

**1,079**

Max number of  
deployments in a  
single hour

**10,000**

Mean number of  
hosts  
simultaneously  
receiving a  
deployment

**30,000**

Max number of  
hosts  
simultaneously  
receiving a  
deployment

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Donna

Oggetti Selezionati Mostra altro

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# \$83 MILLION IN TRANSACTIONS

# 4.2 MILLION ITEMS SOLD

OCTOBER 2012

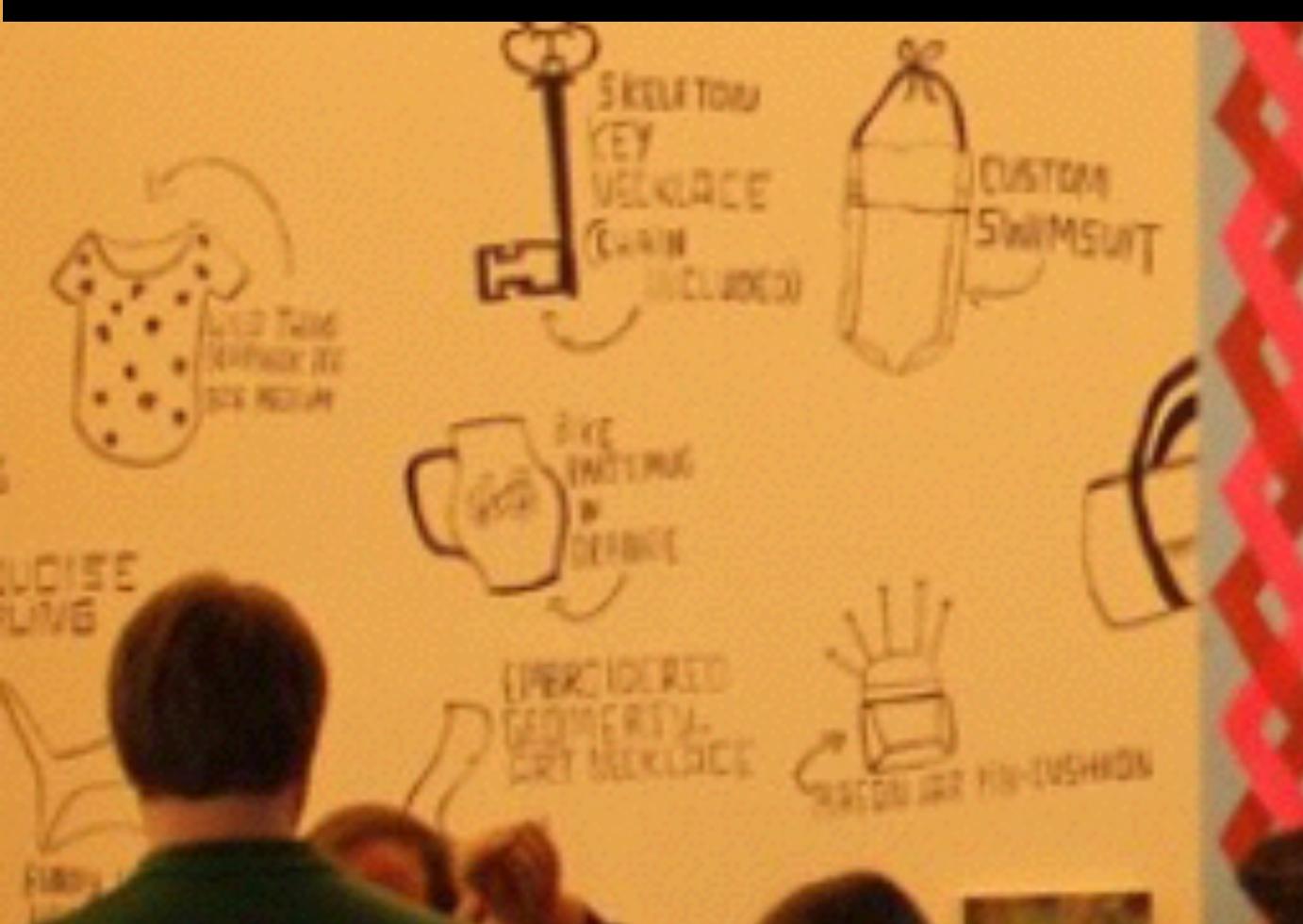
**30 DEPLOYS PER DAY**  
**1 DEPLOY EVERY 20 MINUTES**

HOW LONG DOES IT TAKES YOU  
TO DEPLOY A CODE CHANGE?

**SPEED OF ITERATION  
BEATS QUALITY OF ITERATION**

# DATA-DRIVEN ARCHITECTURES

# METRICS @ETSY





## FOCUS ON YOUR BUSINESS

« Civilisation advances by extending the number of operations we can do without thinking about them. »

– Alfred North Whitehead



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Vacation Rentals, Homes, Apart...



Where are you going?

BROWSE



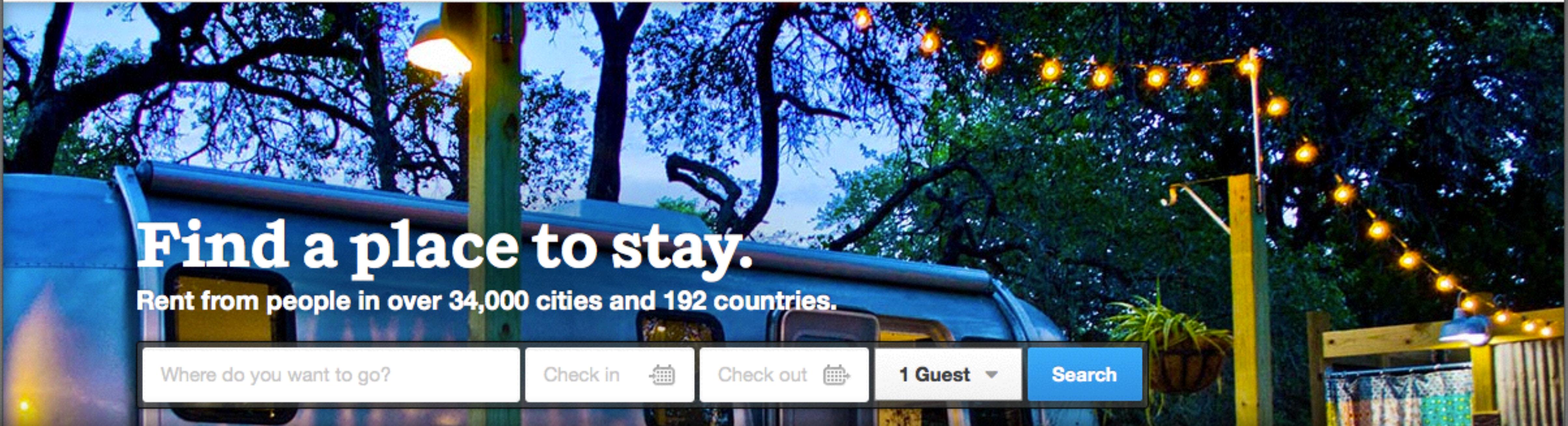
Carlos



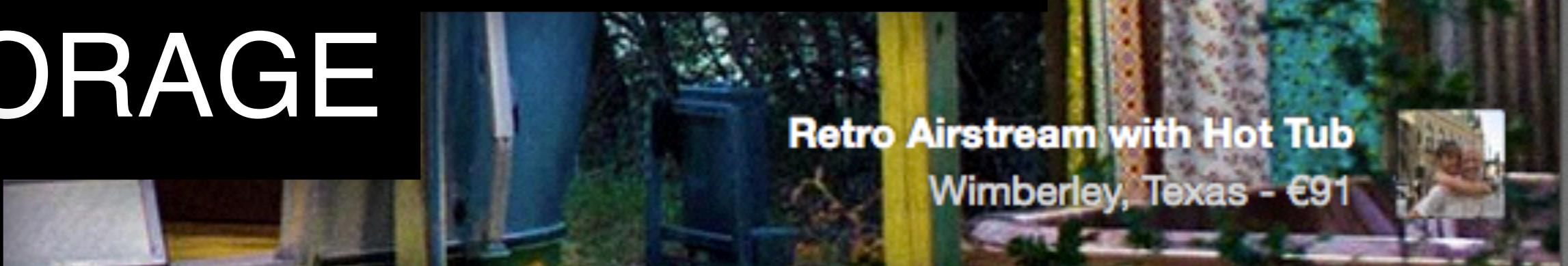
1

HELP

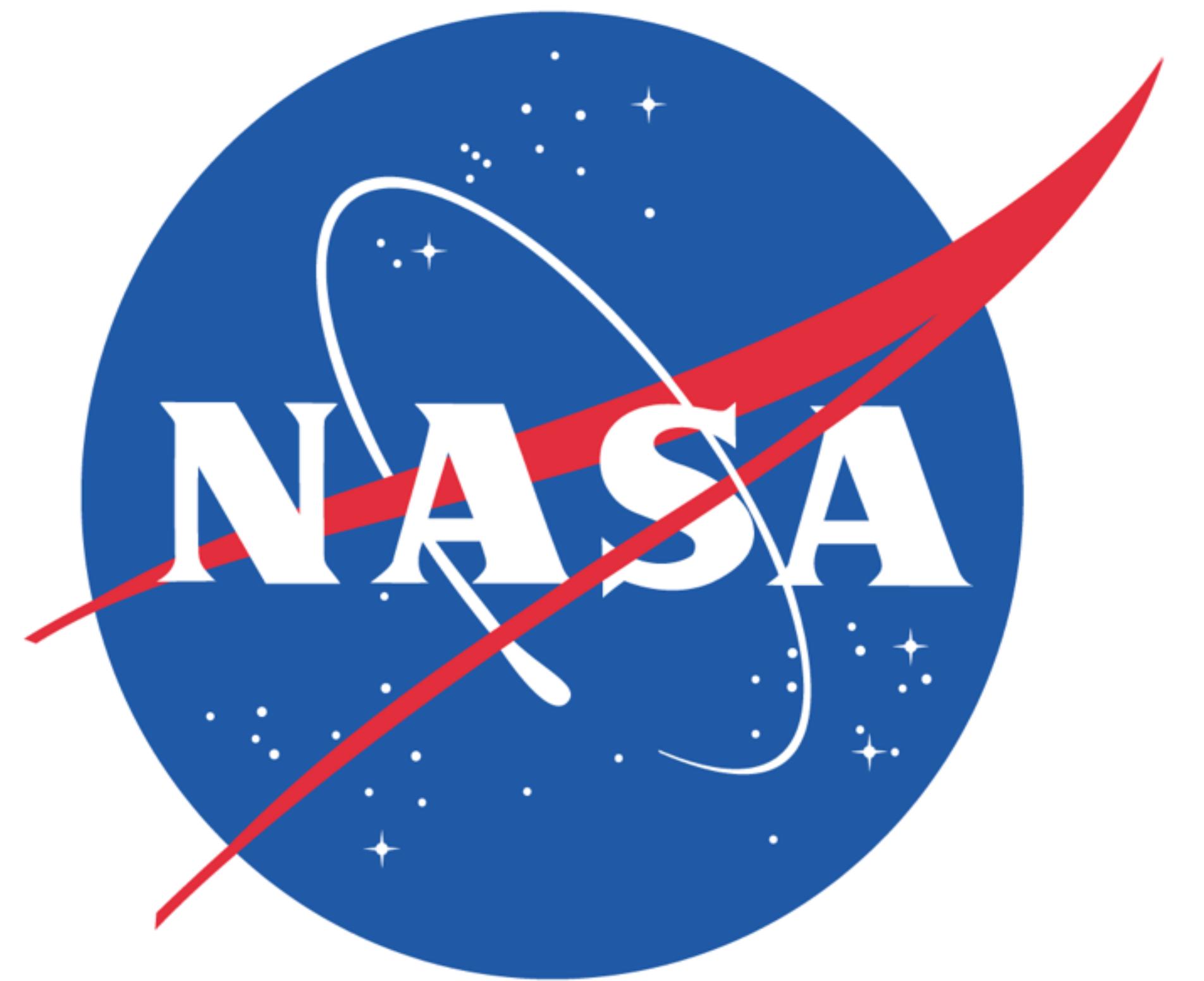
LIST YOUR SPACE

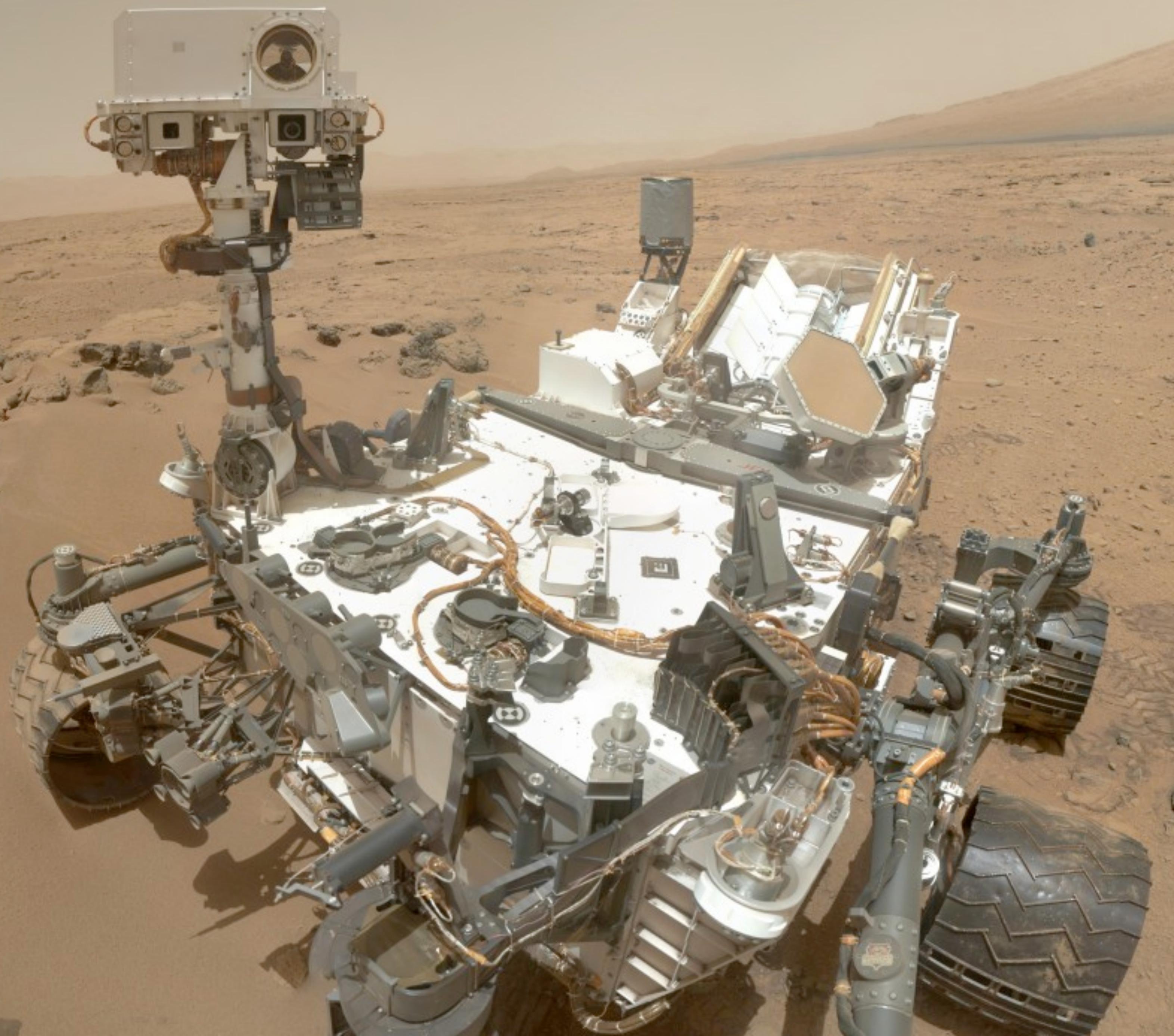


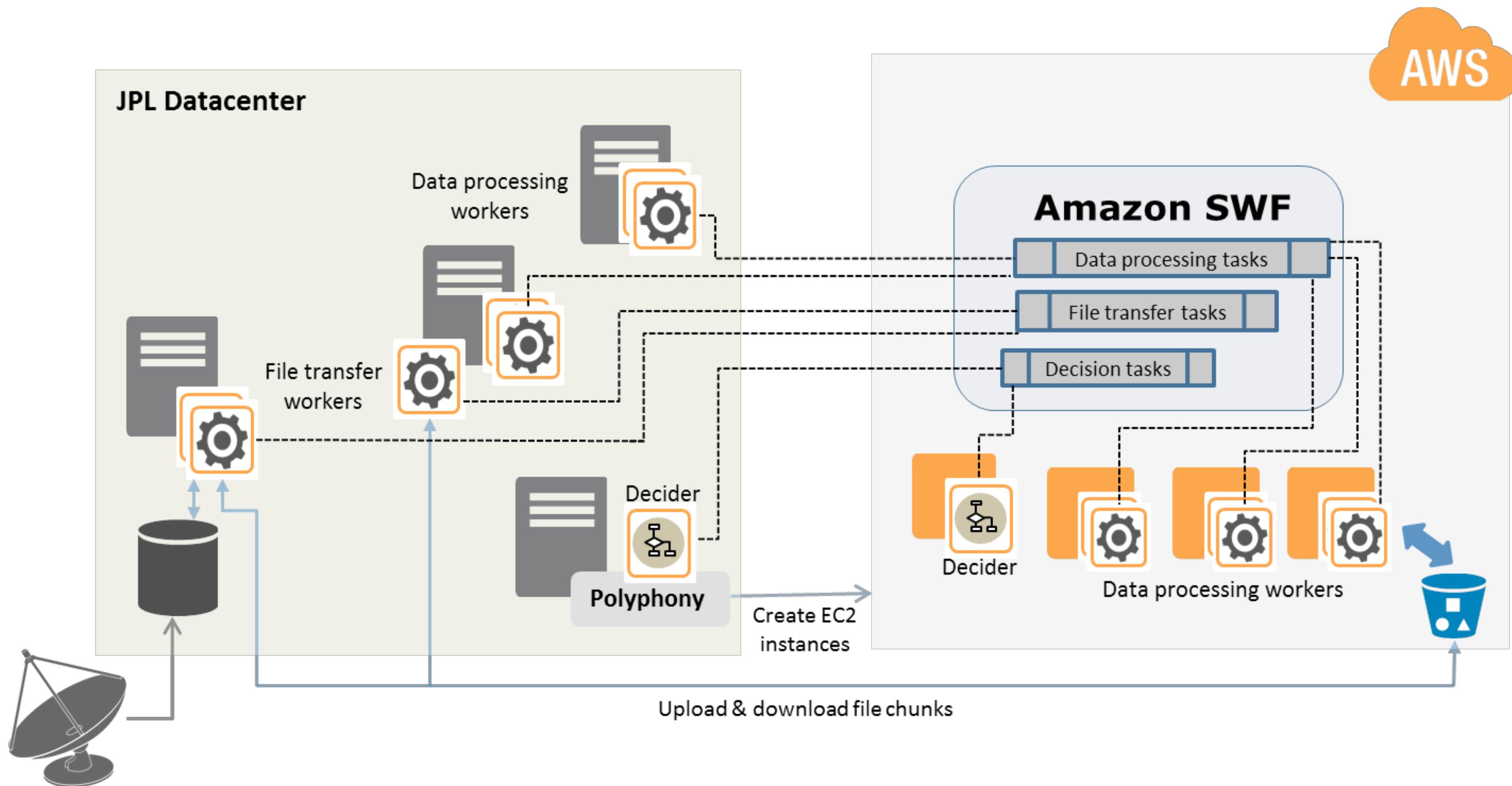
ANY GIVEN NIGHT, 150,000 PEOPLE ARE HOSTED  
1000s OF SERVERS, TBs OF STORAGE  
5 PERSON OPERATIONS TEAM



Neighborhood Guides







**INNOVATION IS NOT A GOAL,  
IT'S AN ONGOING PROCESS**

« I haven't failed, I've just found  
10,000 ways that won't work. »

– Thomas Edison

