

Stupid Ideas for Many Computers

Aja Hammerly

A yellow starburst graphic with a red outline, containing the text "Guaranteed 100% Stupid".

Guaranteed
100% Stupid

No Good Ideas In This Talk

Aja Hammerly

<http://github.com/thagomizer>

@thagomizer_rb

<http://www.thagomizer.com>



Google Cloud Platform



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Stupid

Tweets & Emoji

sen·ti·ment a·nal·y·sis (noun)

the process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc., is positive, negative, or neutral.

Hard

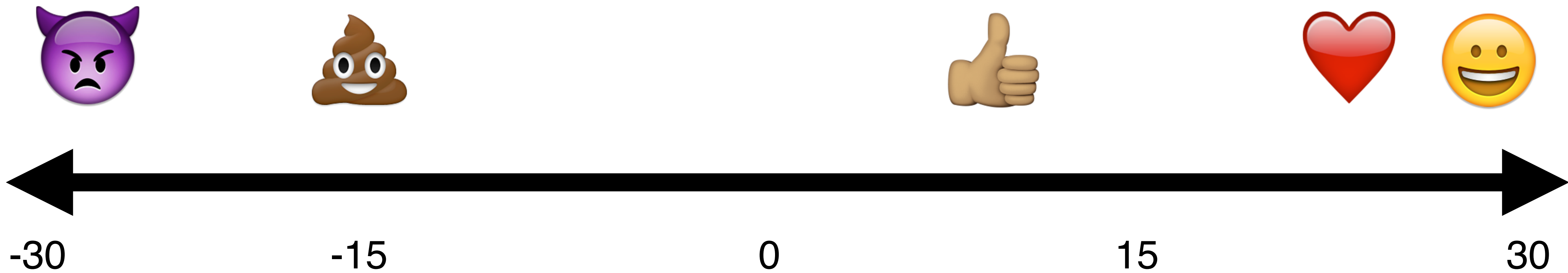
"Sure, I'd love to"



Positive

Negative





Tweets

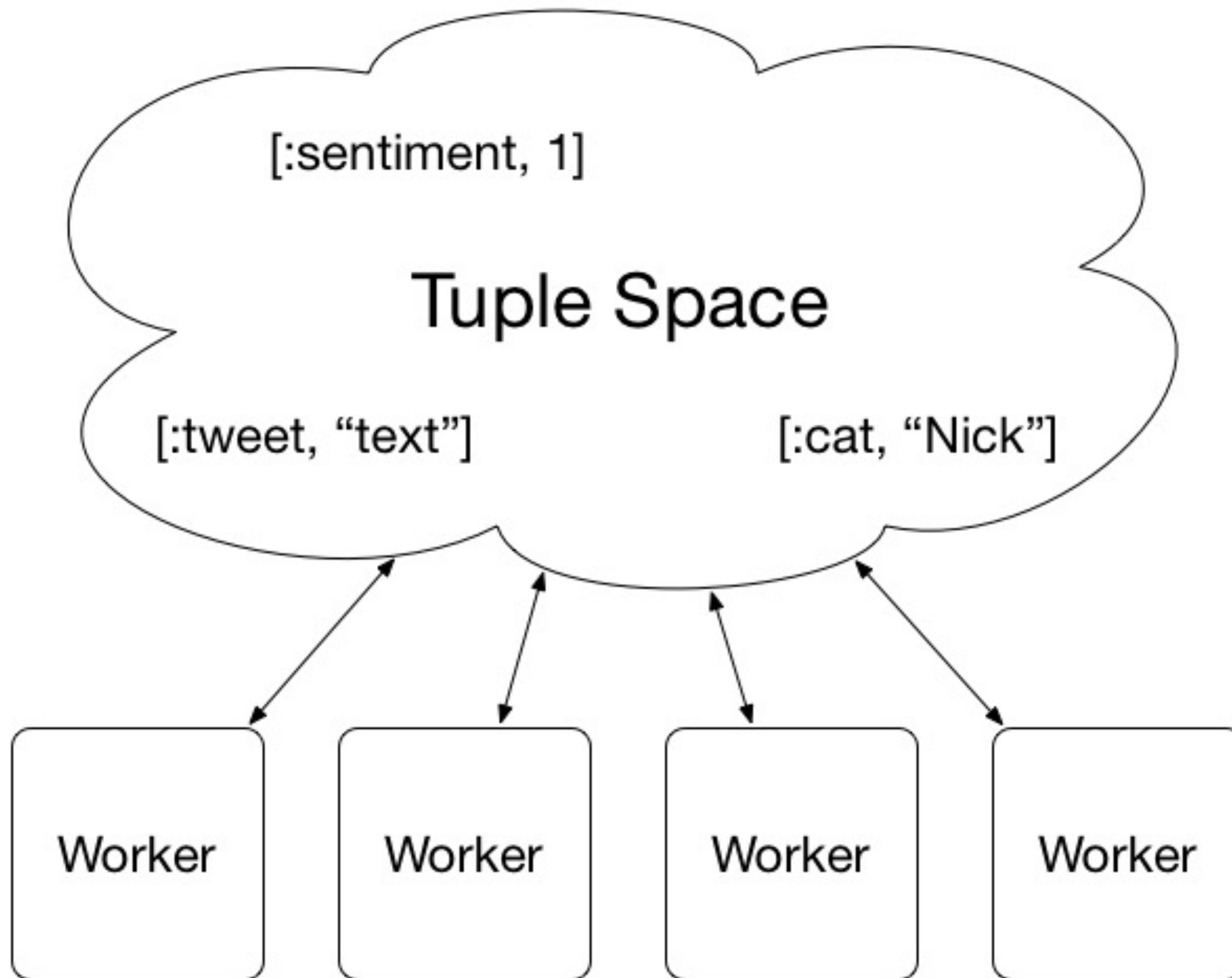
Code

SENTIMENTS = { " :-) " => 10,
" 😊 " => 30,
" ❤️ " => 5,
" (: " => 5,
" 😡 " => -15,
" :-D " => 15,
" 👍 " => 7,
" 🍌 " => -30 }

```
def analyze tweet
  SENTIMENTS.each do |s, val|
    if tweet.include? s then
      sentiment += val
    end
  end
end
```


Many Computers!

Linda



Server

```
require 'rinda/tuplespace'
```

```
URI = ARGV[0] || "druby://0.0.0.0:61676"
```

```
DRb.start_service(URI, Rinda::TupleSpace.new)
```

```
DRb.thread.join
```

3 Worker Types

Server (Tuple Space)

Fetcher

Analyzer

Reducer

Server (Tuple Space)

`[:tweet, "My :-)"]`

Fetcher

Analyzer

Reducer

Server (Tuple Space)

```
[:tweet, "My :-)"]
```

Fetcher

Analyzer

Reducer

Server (Tuple Space)

Fetcher

Analyzer

Reducer

`[:tweet, "My :-)"]`

Server (Tuple Space)

Fetcher

[:sentiment, 10]

Analyzer

Reducer

Server (Tuple Space)

```
[:sentiment, 10]
```

Fetcher

Analyzer

Reducer

Server (Tuple Space)

Fetcher

Analyzer

Reducer

`[:sentiment, 10]`

Server (Tuple Space)

Fetcher

Analyzer

total_sentiment = 10

Reducer

Making It Go

Kubernetes

Kubernetes

(Duh!)

Server

```
FROM ruby:latest
RUN mkdir -p /usr/src/app
WORKDIR /usr/src/app

COPY . /usr/src/app

EXPOSE 3000

CMD ["/rinda_server.rb", "druby://  
0.0.0.0:3000"]
```

Replication Controller

```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: server
  name: server-controller
spec:
  replicas: 1
  selector:
    name: server
  template:
    metadata:
      labels:
        name: server
    spec:
      containers:
      - image: gcr.io/stupid_ideas/tweet_server:latest
        name: server
        ports:
        - port: 3000
          containerPort: 3000
          targetPort: 3000
```

```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: server
  name: server-controller
spec:
  replicas: 1
  selector:
    name: server
  template:
    metadata:
      labels:
        name: server
    spec:
      containers:
      - image: gcr.io/stupid_ideas/tweet_server:latest
        name: server
        ports:
        - port: 3000
          containerPort: 3000
          targetPort: 3000
```

Service

```
apiVersion: v1
kind: Service
metadata:
  name: server
  labels:
    name: server
spec:
  type: LoadBalancer
  ports:
    - port: 3000
      targetPort: 3000
      protocol: TCP
  selector:
    name: server
```


Fetcher

```
FROM ruby:latest
RUN mkdir -p /usr/src/app
WORKDIR /usr/src/app

COPY . /usr/src/app

EXPOSE 3000

CMD ["/rinda_fetcher.rb"]
```

Pod

```
apiVersion: v1
kind: Pod
metadata:
  labels:
    name: fetcher
  name: fetcher
spec:
  containers:
  - image: gcr.io/stupid_ideas/tweet_fetcher:latest
    name: fetcher
```

Analyzer

```
FROM ruby:latest
RUN mkdir -p /usr/src/app
WORKDIR /usr/src/app

COPY . /usr/src/app

EXPOSE 3000

CMD ["/usr/src/app/rinda_analyzer.rb"]
```

Replication Controller

```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: analyzer
  name: analyzer-controller
spec:
  replicas: 5
  selector:
    name: analyzer
  template:
    metadata:
      labels:
        name: analyzer
    spec:
      containers:
      - image: gcr.io/stupid-ideas/tweet_analyzer:latest
        name: analyzer
```


Reducer

```
FROM ruby:latest
RUN mkdir -p /usr/src/app
WORKDIR /usr/src/app

COPY . /usr/src/app

EXPOSE 3000

CMD ["/rinda_reducer.rb"]
```

Replication Controller

```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: reducer
  name: reducer-controller
spec:
  replicas: 1
  selector:
    name: reducer
  template:
    metadata:
      labels:
        name: reducer
    spec:
      containers:
      - image: gcr.io/stupid-ideas/tweet_reducer:latest
        name: reducer
```

Demo

#KubeConEmoji

Latin Squares

Latin Square

In combinatorics and in experimental design, a Latin square is an $n \times n$ array filled with n different symbols, each occurring exactly once in each row and exactly once in each column.

A	B	C	D
D	A	B	C
B	C	D	A
C	D	A	B



Euler

Simple

4 x 4

576

6 x 6

812,851,200

9 x 9

5	3			7				
6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9

<https://en.wikipedia.org/wiki/Sudoku#/media/File:Sudoku-by-L2G-20050714.svg>

5,524,751,496,156,892,842,531,225,600

$\sim 5 \times 10^{27}$

Code

Sieve

```
SIZE = ARGV[0].to_i || 6

# generate all permutations of size n
permutates = (1..SIZE).to_a.permutation.map { |n| n }

# generate all size n permutations of the permutations
permutates.permutation(SIZE).each do |grid|
  pp grid
end
```

```
SIZE = ARGV[0].to_i || 6

# generate all permutations of size n
permutates = (1..SIZE).to_a.permutation.map { |n| n }

# generate all size n permutations of the permutations
permutates.permutation(SIZE).each do |grid|
  pp grid
end
```



```
SIZE = ARGV[0].to_i || 6

# generate all permutations of size n
permuter = (1..SIZE).to_a.permutation.map { |n| n }

# generate all size n permutations of the permutations
permuter.permutation(SIZE).each do |grid|
  pp grid
end
```

```
[ [1, 2, 3, 4, 5],  
  [1, 2, 3, 5, 4],  
  [1, 5, 4, 2, 3],  
  [5, 3, 4, 2, 1],  
  [3, 2, 1, 5, 4]]
```

```
[ [1, 2, 3, 4, 5],  
  [1, 2, 3, 5, 4],  
  [1, 5, 4, 2, 3],  
  [5, 3, 4, 2, 1],  
  [3, 2, 1, 5, 4]]
```

$$(n!)! / (n! - n)!$$

$O(n!!)$

$\sim 1 \times 10^{50}$

```
size = solution[0].length
example = (1..size).to_a

correct = solution.all? { |row| row.sort == example } &&
          solution.transpose.all? { |col| col.sort == example }

if correct then
  pp solution
end
```

10^{50}

SCALE!!!!

Server

Generator

Checker

Deployment

Same As Before

Same Dockerfiles

Server


```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: server
  name: server-controller
spec:
  replicas: 1
  selector:
    name: server
  template:
    metadata:
      labels:
        name: server
    spec:
      containers:
      - image: gcr.io/stupid_ideas/latin_server:latest
        name: server
        ports:
        - port: 3000
          containerPort: 3000
          targetPort: 3000
```

```
apiVersion: v1
kind: Service
metadata:
  name: server
  labels:
    name: server
spec:
  type: LoadBalancer
  ports:
    - port: 3000
      targetPort: 3000
      protocol: TCP
  selector:
    name: server
```

Generator

```
apiVersion: v1
kind: Pod
metadata:
  labels:
    name: generator
  name: generator
spec:
  containers:
  - image: gcr.io/stupid_ideas/
latin_generator:latest
    name: generator
restartPolicy: OnFailure
```

Checker

```
apiVersion: v1
kind: ReplicationController
metadata:
  labels:
    name: checker
  name: checker-controller
spec:
  replicas: 15
  selector:
    name: checker
  template:
    metadata:
      labels:
        name: checker
    spec:
      containers:
      - image: gcr.io/stupid-ideas/latin_checker:latest
        name: checker
```

10 Nodes

Navigation bar with icons for menu, home, settings, search, and user profile. Search bar contains 'text:###'.

Logging

Logs Exports Metrics

Filtering controls: Compute Engine, All resource types, All res..., All logs, Any log level, Up to: Nov 10, 2015, 10:57:28 AM PST

2015-11-10			Scanned: 2015-11-10 (10:57:28) - 2015-11-10 (10:57:28)	View Options
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	
▶ *	gke-latin-d23f4847-no...	10:57:28.000	{"log":"### [[1, 2, 3, 4, 5, 6, 7, 8, 9], [1, 2, 3, 4, 5, 6, 7, 9, 8], [1, 2, 3, 4, 5, 6, 8, 7, 9], [1, 2, 3, 4, ...	



Profound Thoughts

Useful

~~Useful~~

Correct Tool

~~Correct Tool~~

Fun

Yes

Fast

Power

Computer?

Limits

Distributed Systems
Are
Fun & Easy

Fun

Thank You