EFFICIENT JAVA

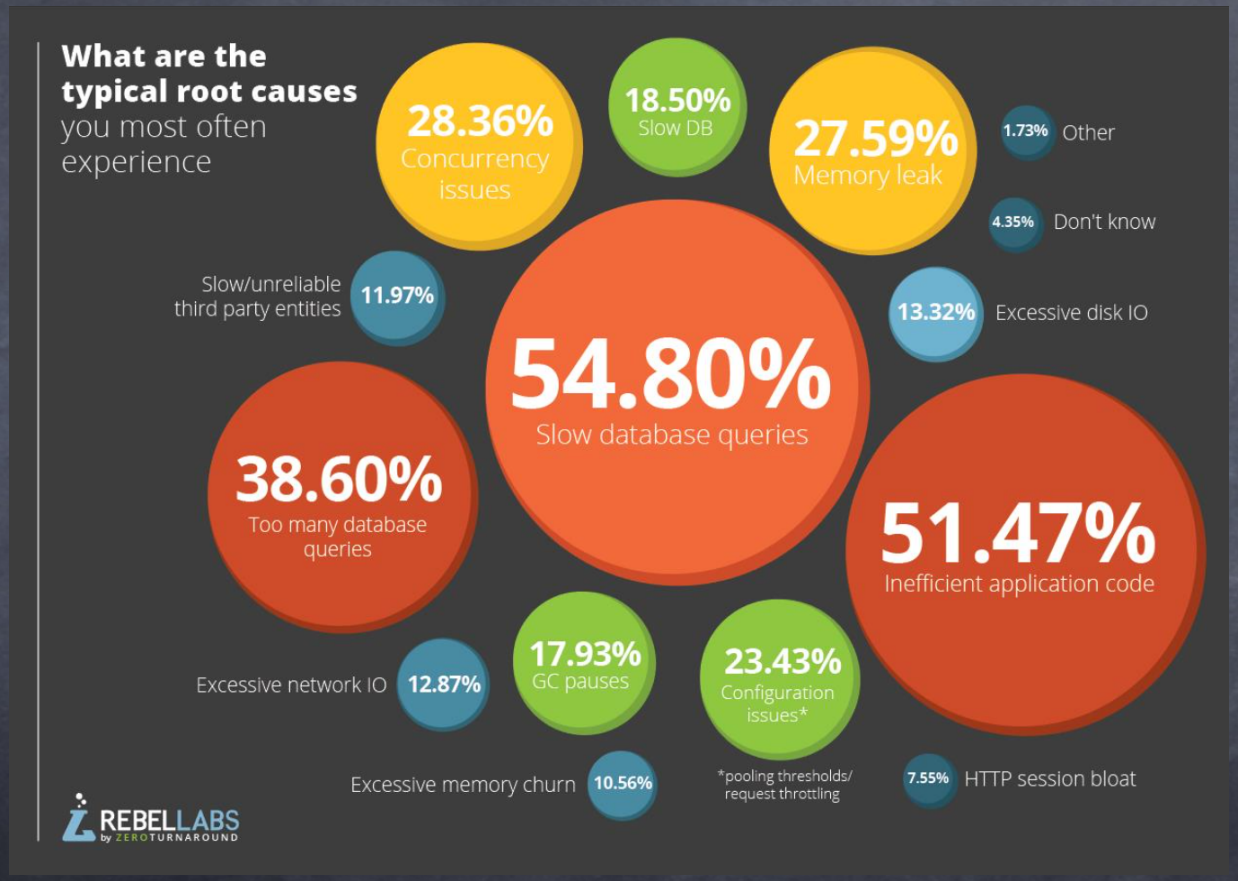
MEMORY

OUR MARKETING SLIDE

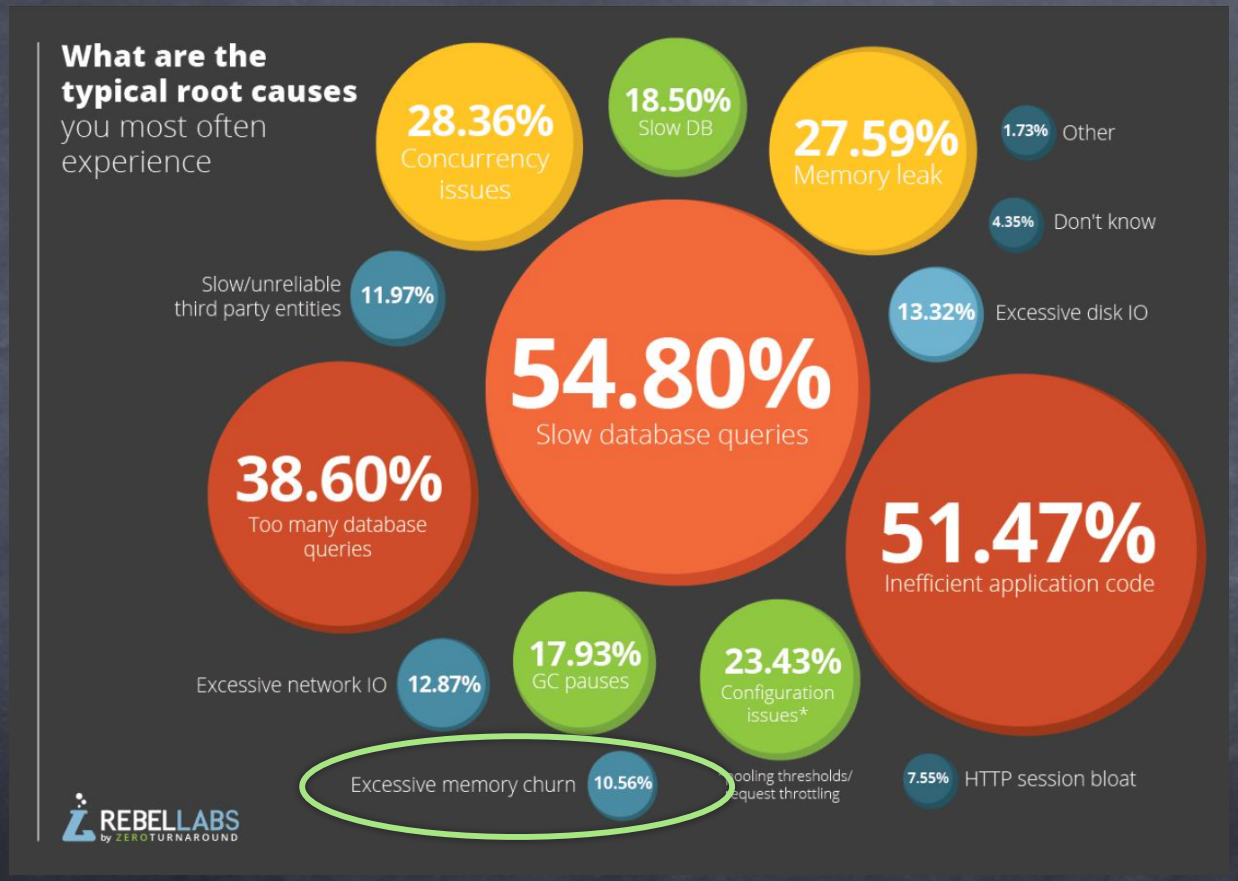
- Kirk Pepperdine
  - Author of jPDM, a performance diagnostic model
  - Author of the original Java Performance Tuning workshop
- Co-founded jClarity
  - Building the smart generation of performance diagnostic tooling
    - Bring predictability into the diagnostic process
- Co-founded JCrete
  - The hottest unconference on the planet
- Java Champion

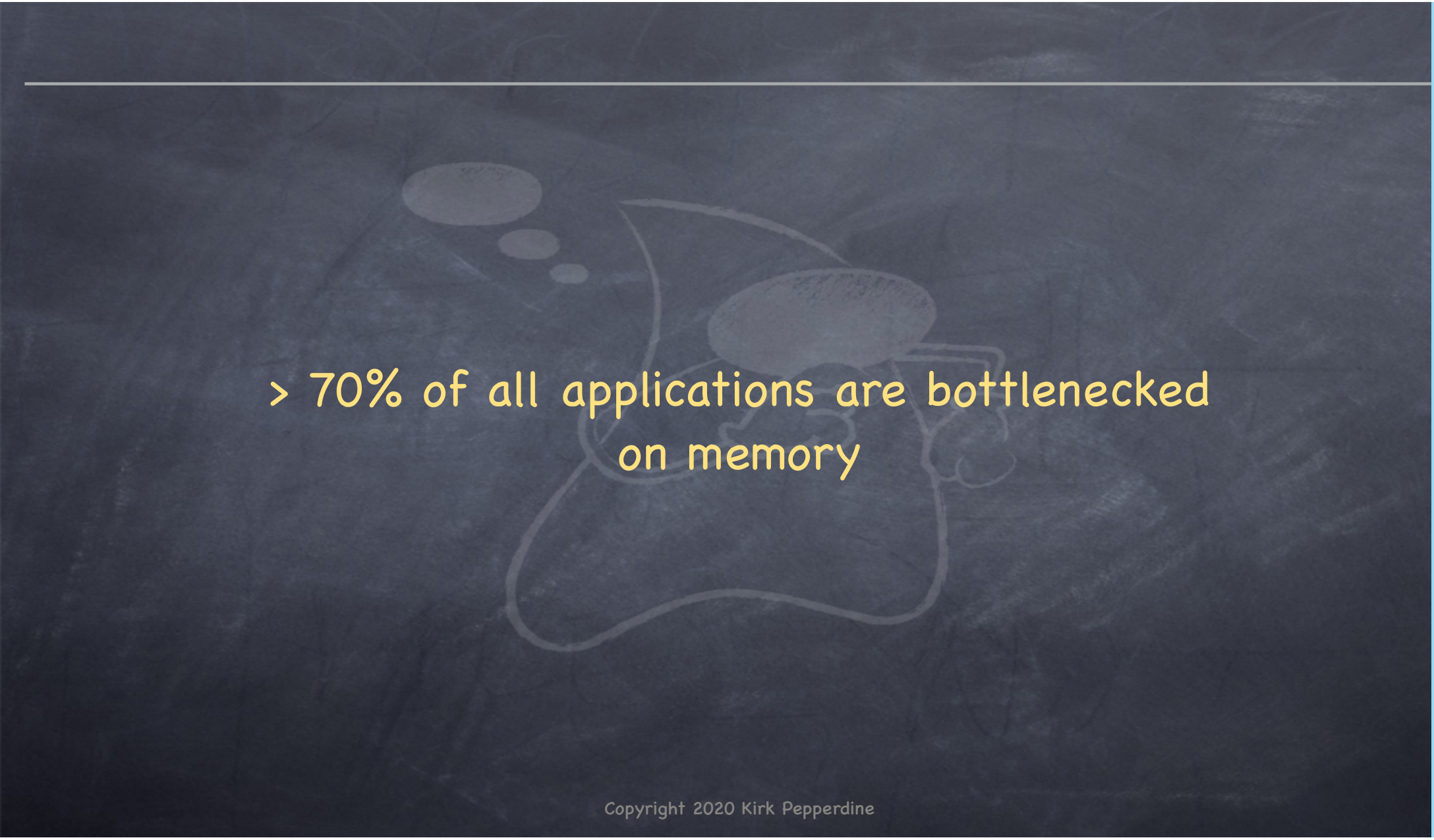
Demo

INDUSTRY SURVEY



INDUSTRY SURVEY





DO YOU USE

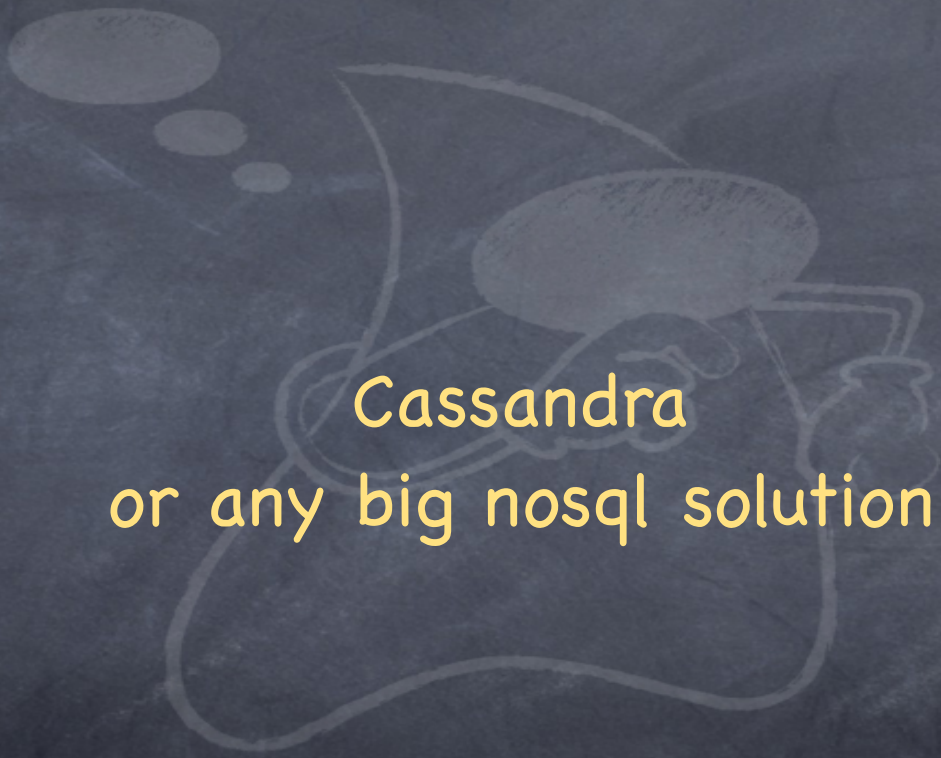
DO YOU USE

Spring Boot

DO YOU USE

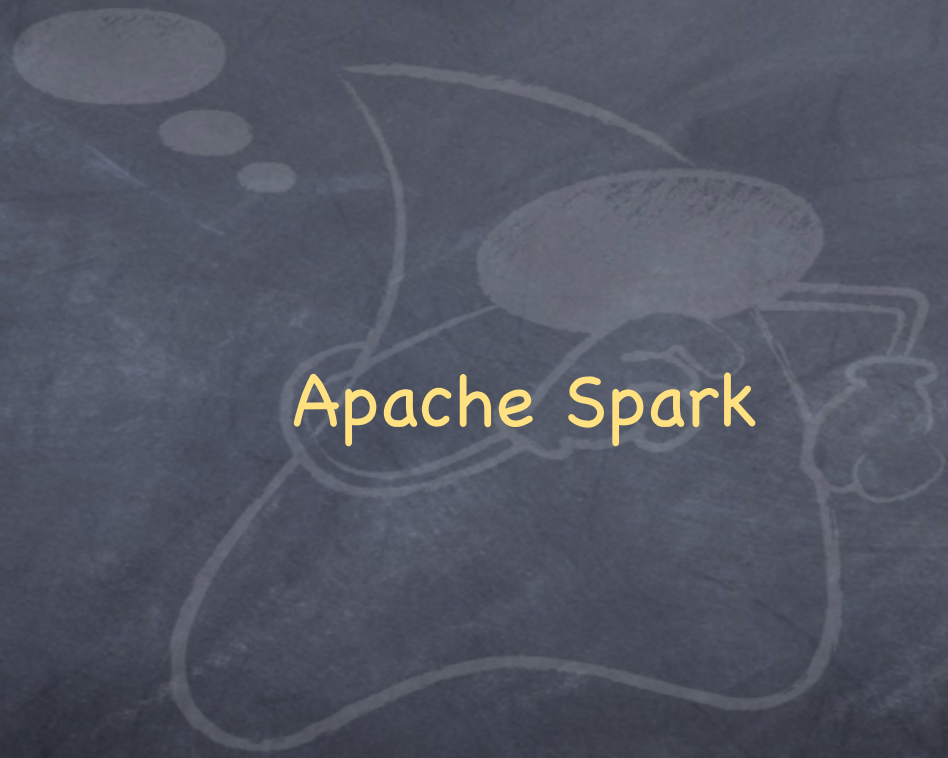
Cassandra

DO YOU USE



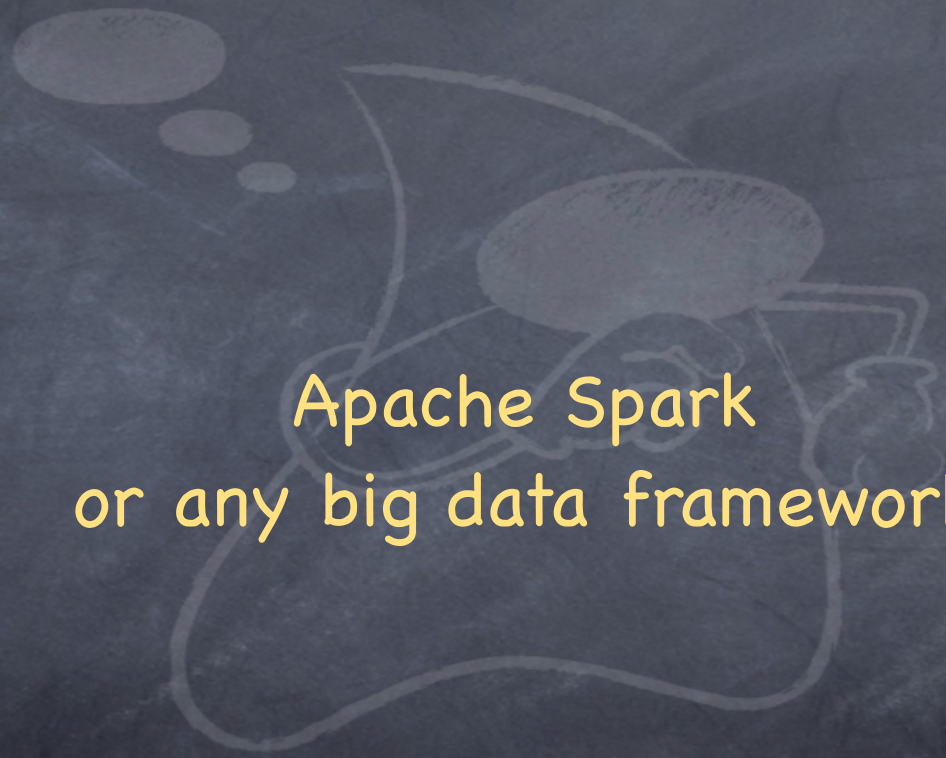
Cassandra
or any big nosql solution

DO YOU USE



Apache Spark

DO YOU USE



Apache Spark
or any big data framework

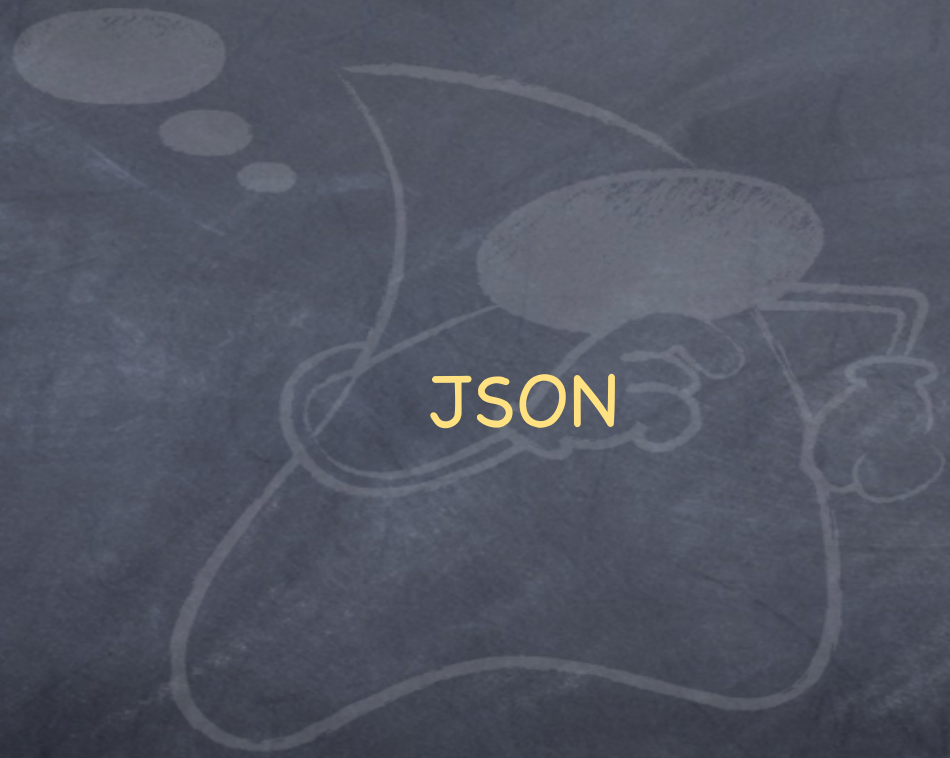
DO YOU USE

Log4J

DO YOU USE

Log4J
or any Java logging framework

DO YOU USE



JSON

DO YOU USE

JSON

With almost any Marshalling protocol

DO YOU USE

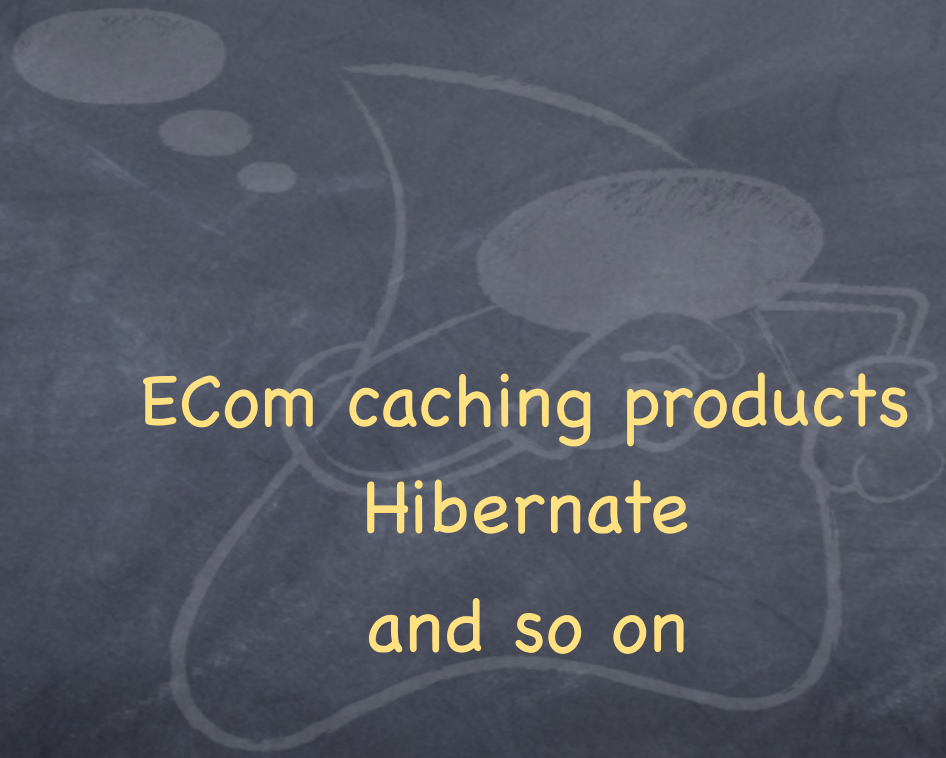
ECom caching products

DO YOU USE

ECom caching products

Hibernate

DO YOU USE

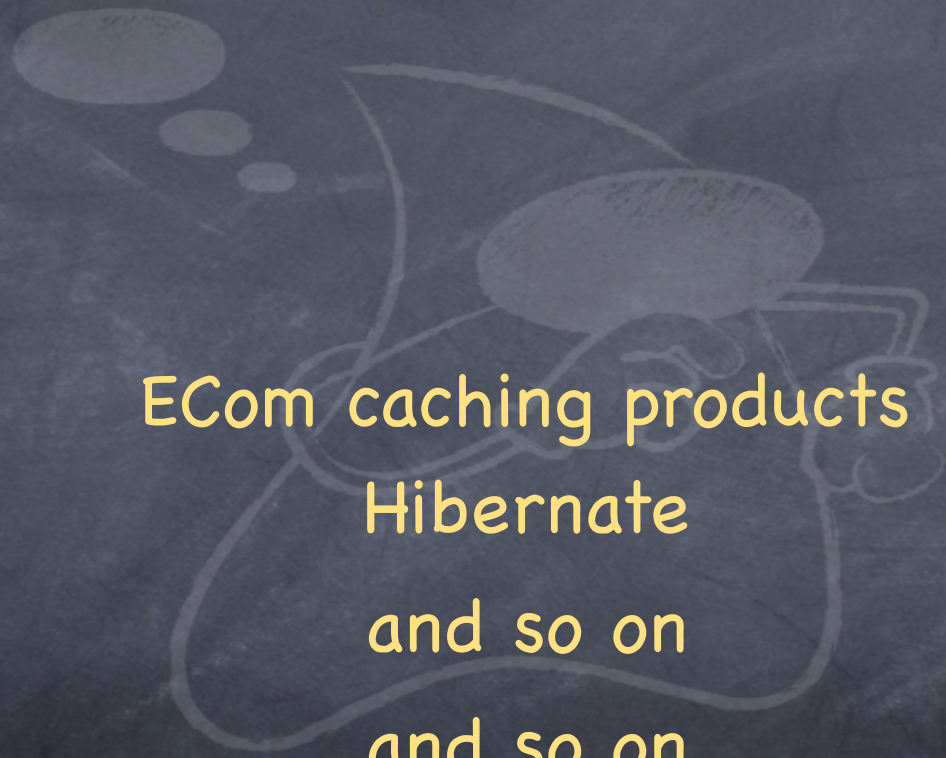


ECom caching products

Hibernate

and so on

DO YOU USE



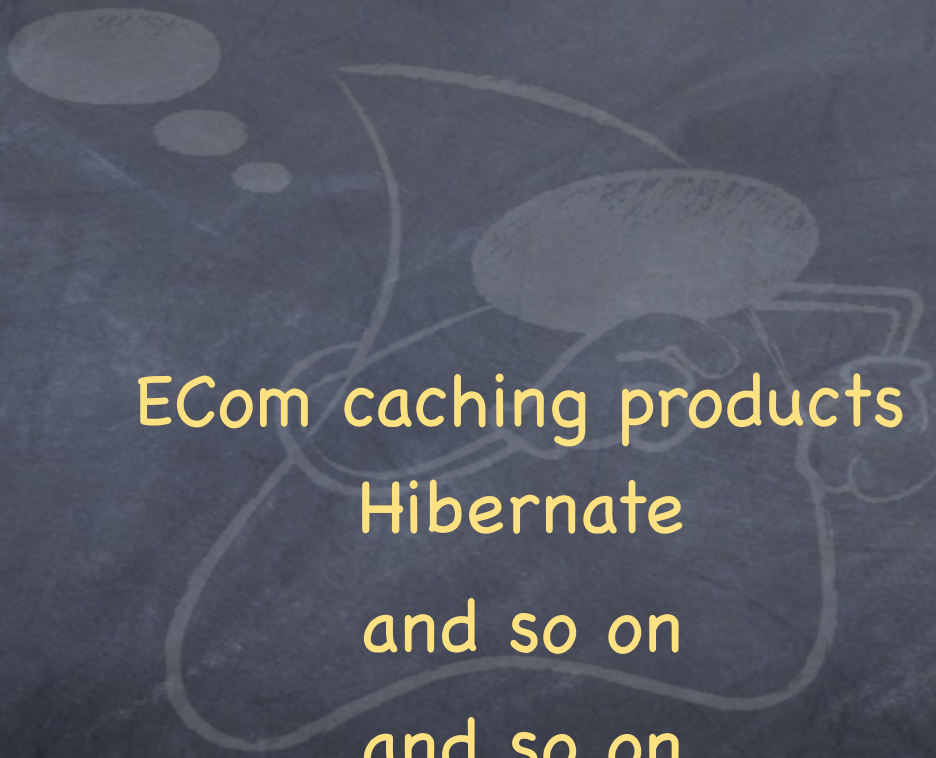
ECom caching products

Hibernate

and so on

and so on

DO YOU USE



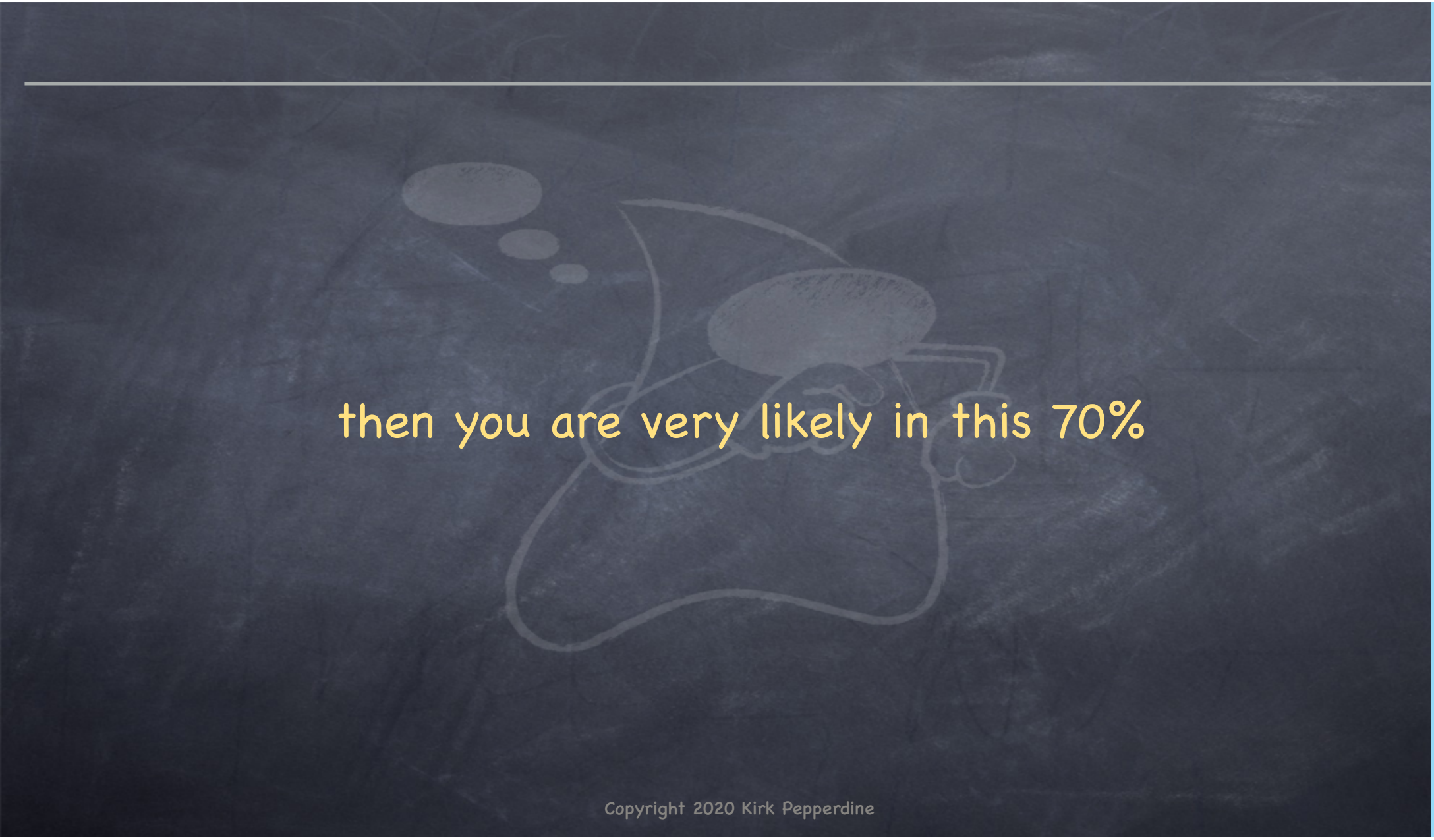
ECom caching products

Hibernate

and so on

and so on

and so on



WAR STORIES

- Reduced allocation rates from 1.8gb/sec to 0
  - tps jumped from 400,000 to 25,000,000!!!
- Stripped all logging our of a transactional engine
  - Throughput jumped by a factor of 4x
- Wrapped 2 logging statements in a web socket framework
  - Memory churn reduced by a factor of 2
- and .....

ALLOCATION SITE


```
Foo foo = new Foo();
```

forms an allocation site

```
0: new           #2   // class java/lang/Object
2: dup
4: invokespecial #1   // Method java/lang/Object."<init>":()V
```

- Allocation will (mostly) occur in Java heap
  - fast path
  - slow path
  - small objects maybe optimized to an scalar allocation

ALLOCATIONS

- Size vs. Frequency
  - cost of allocating large objects mostly equal to cost smaller objects
  - cost of allocations is mostly inexpensive
    - cheap * a lot == expensive

- Allocation rate is an approximation of allocation frequency
  - use allocation rate as a proxy measure for allocation frequency

REDUCING ALLOCATIONS

OTHER PROBLEMS

- High memory churn rates
  - many temporary objects

- Quickly fill Eden
  - frequent young gc cycles
  - speeds up aging
  - premature promotion
    - more frequent tenured cycles
    - increased copy costs
    - increased heap fragmentation
- Allocation is quick
  - quick * large number = slow

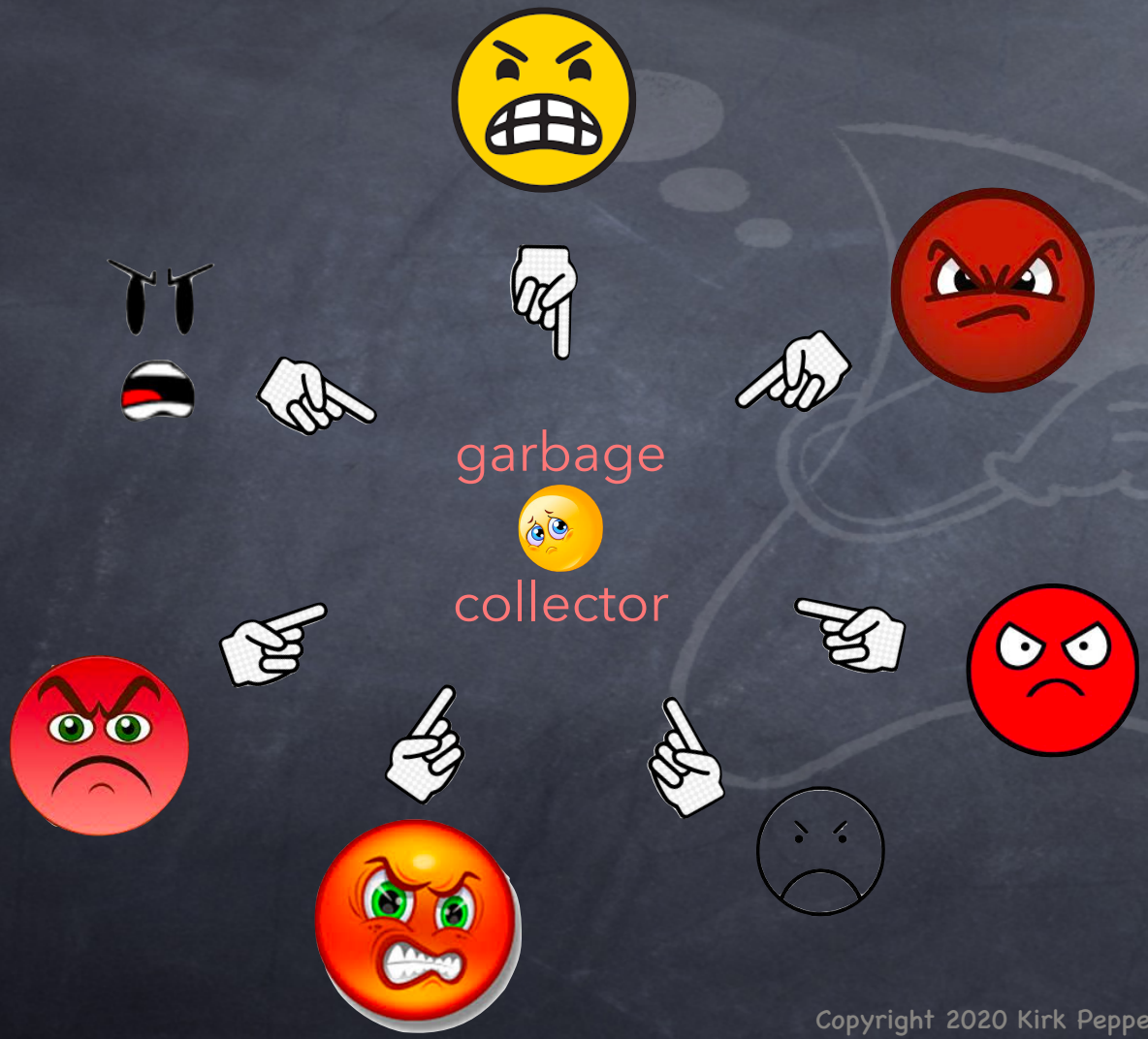
SIDE-EFFECTS

- High memory churn rates
  - many temporary objects

- Quickly fill Eden
  - **frequent young gc cycles**
  - speeds up aging
  - premature promotion
  - **more frequent tenured cycles**
    - increased copy costs
    - increased heap fragmentation
- Allocation is quick
  - quick * large number = slow

Hyper active garbage collector

BLAME GAME



SERIOUSLY????

garbage

collector

DEFENSELESS

garbage

collector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Ask me about our
Java Performance Tuning Workshops