An introduction to
Google App Engine

VPE / CTO
Community of Practice
Connecting Opportunities & Experience

Sunnyvale, CA
April 21, 2009

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Agenda

1. What to do about questions?
2. App Engine introduction
3. Why build it?
4. App Engine Tour
5. What's different?

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App Engine introduction

Google App Engine

Leveraging Google's platform to better serve your customers

Fred Sauer
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Recent announcements

Google Campfire One

(April 7, 2009)

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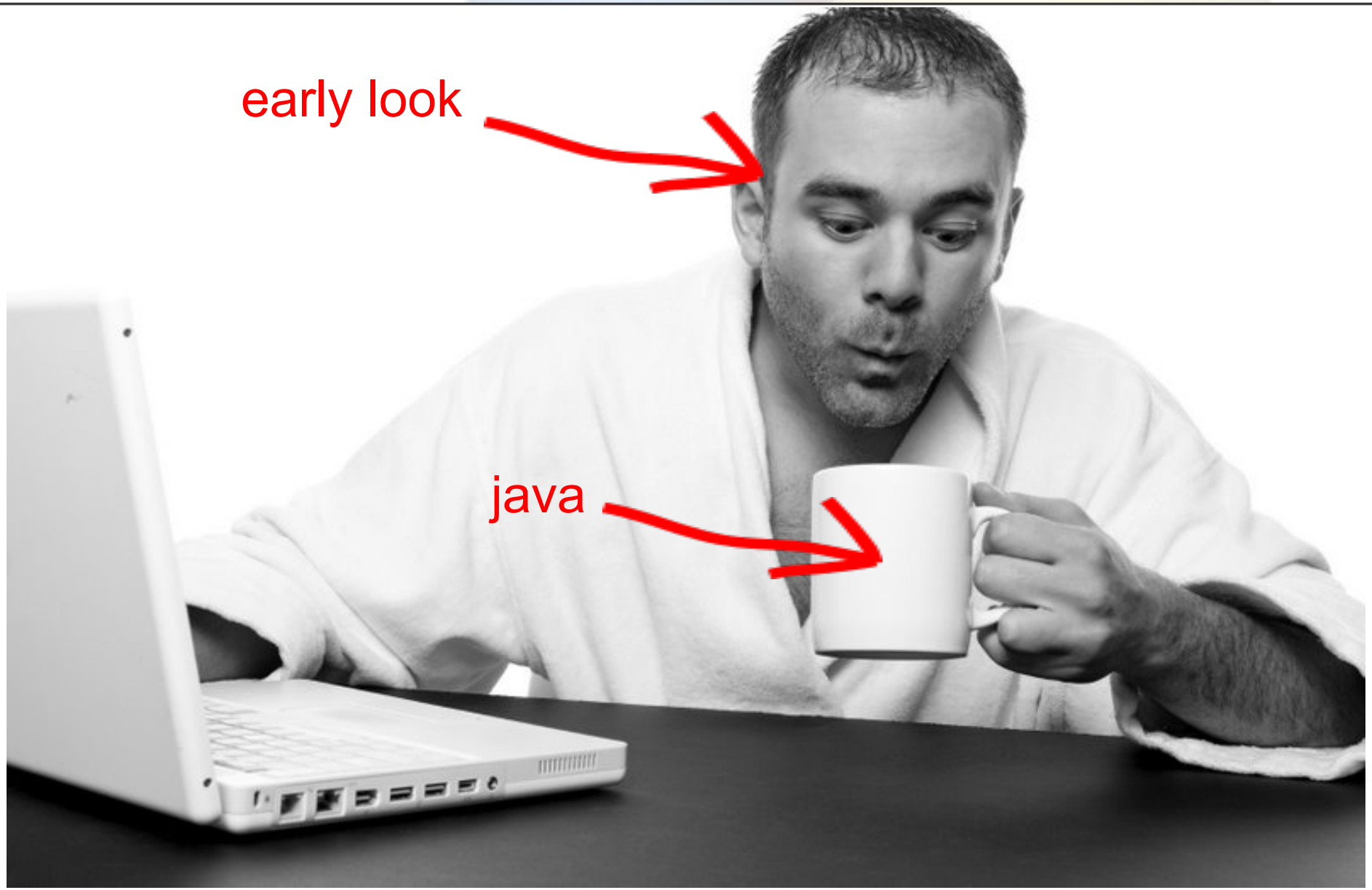
Early look at Java support



150K+ Developers, 50K+ Apps

Why build it?

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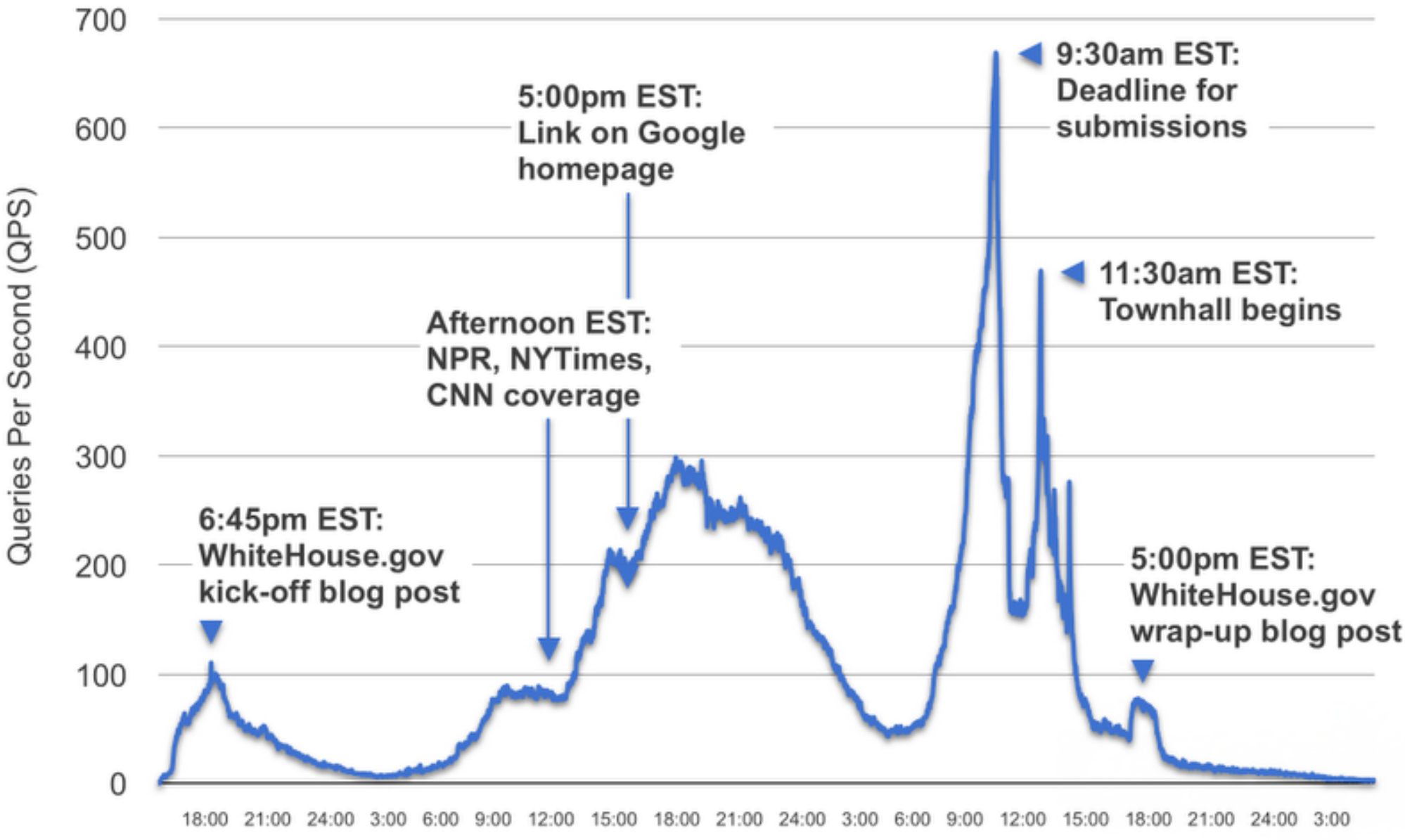
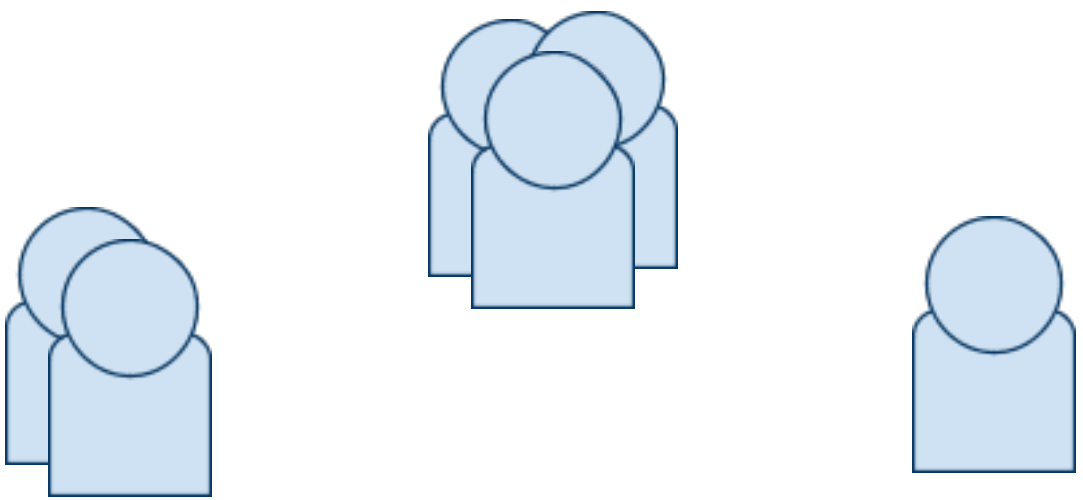
Building web applications is hard

WhiteHouse.gov/openforquestions



Thinking about scalability

Just a few users....



....the tools, platform and design don't matter too much

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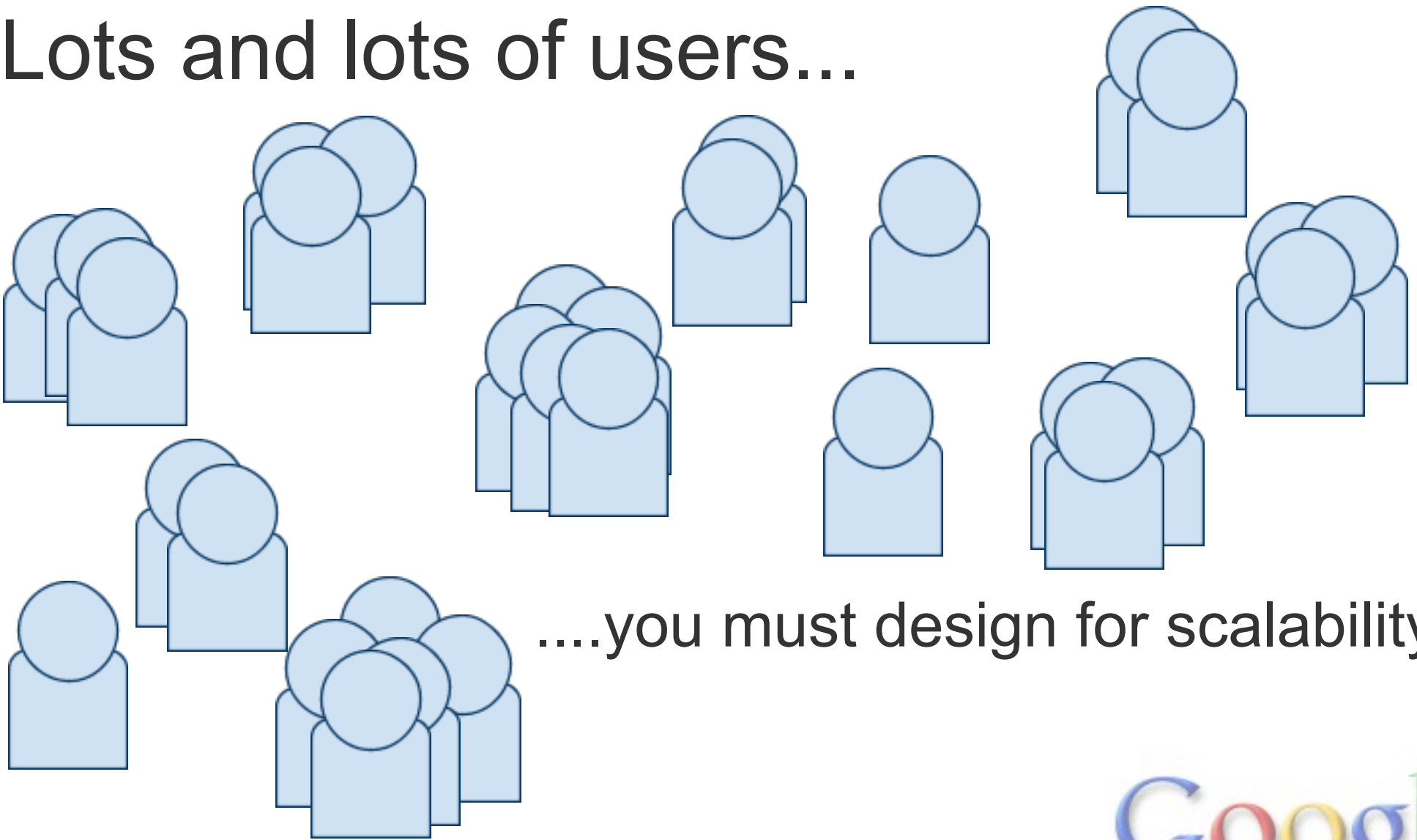
Thinking about scalability

Lots and lots of users...



....you must design for scalability

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But the problem is

When?

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The real problem is

When it happens.

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Serving your customers

Google App Engine

- Scale
- Performance
- Standards
- Cost effective
- Integration
- Services
- Distribution

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App Engine Tour

Python runtime

python™

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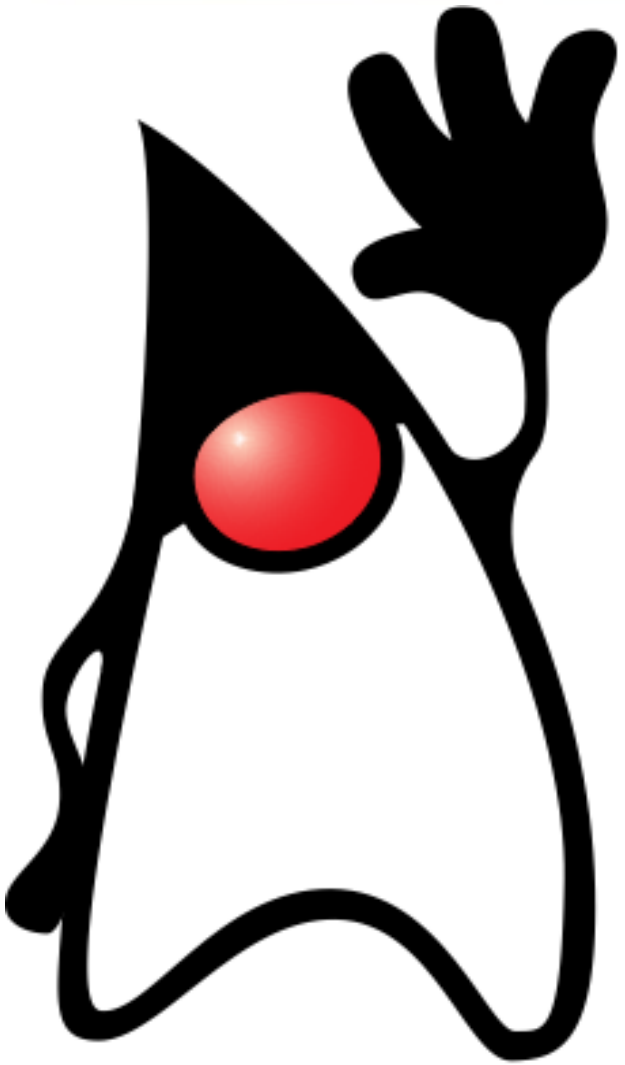
Java runtime



Duke, the Java mascot

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Complete Java development stack

+

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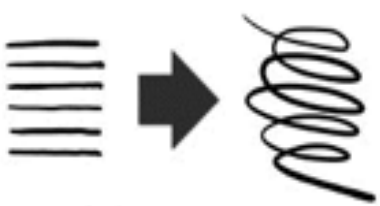
Google Web Toolkit (GWT)

Generates browser-compliant JS + HTML files

Code against Java UI libraries



The compiler translates Java source to highly-optimized JS

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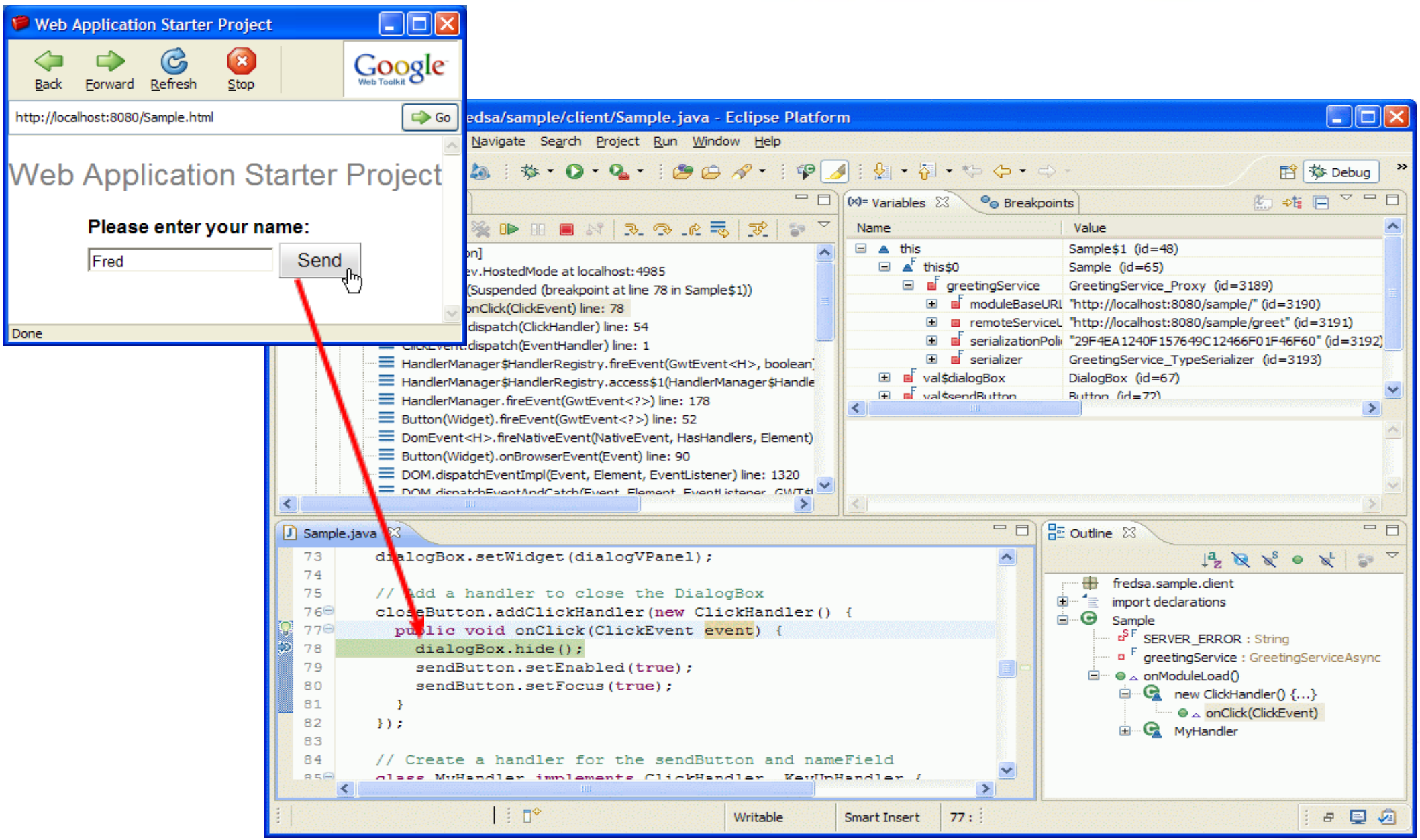
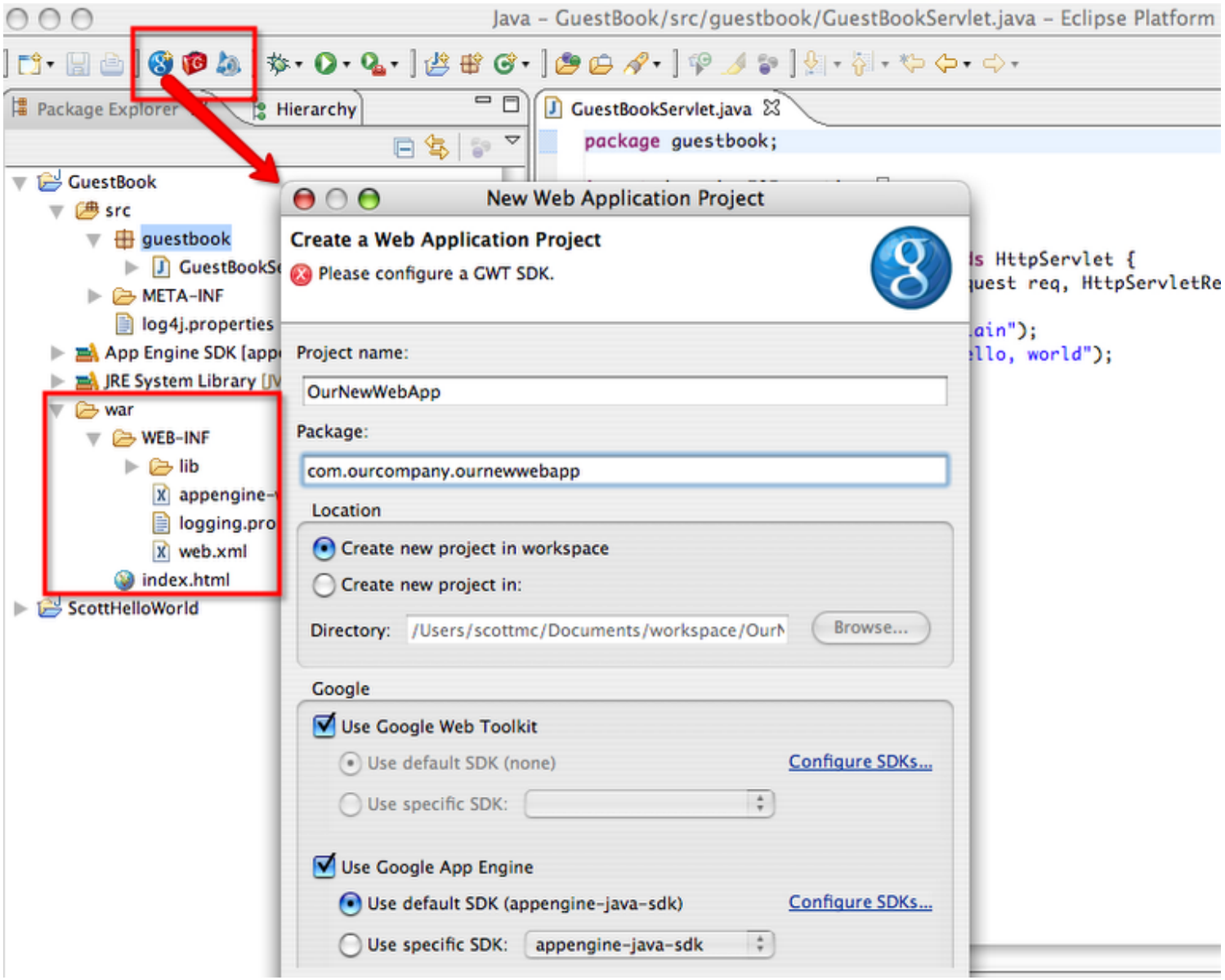
GWT Debugging in the browser

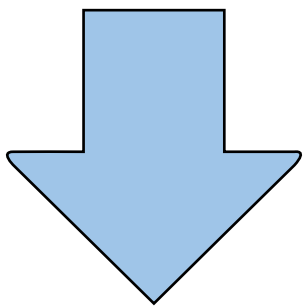


Google Plugin for Eclipse



Google Apps integration

http://appid.**appspot.com**/



http://yourapp.**yourdomain.com**/

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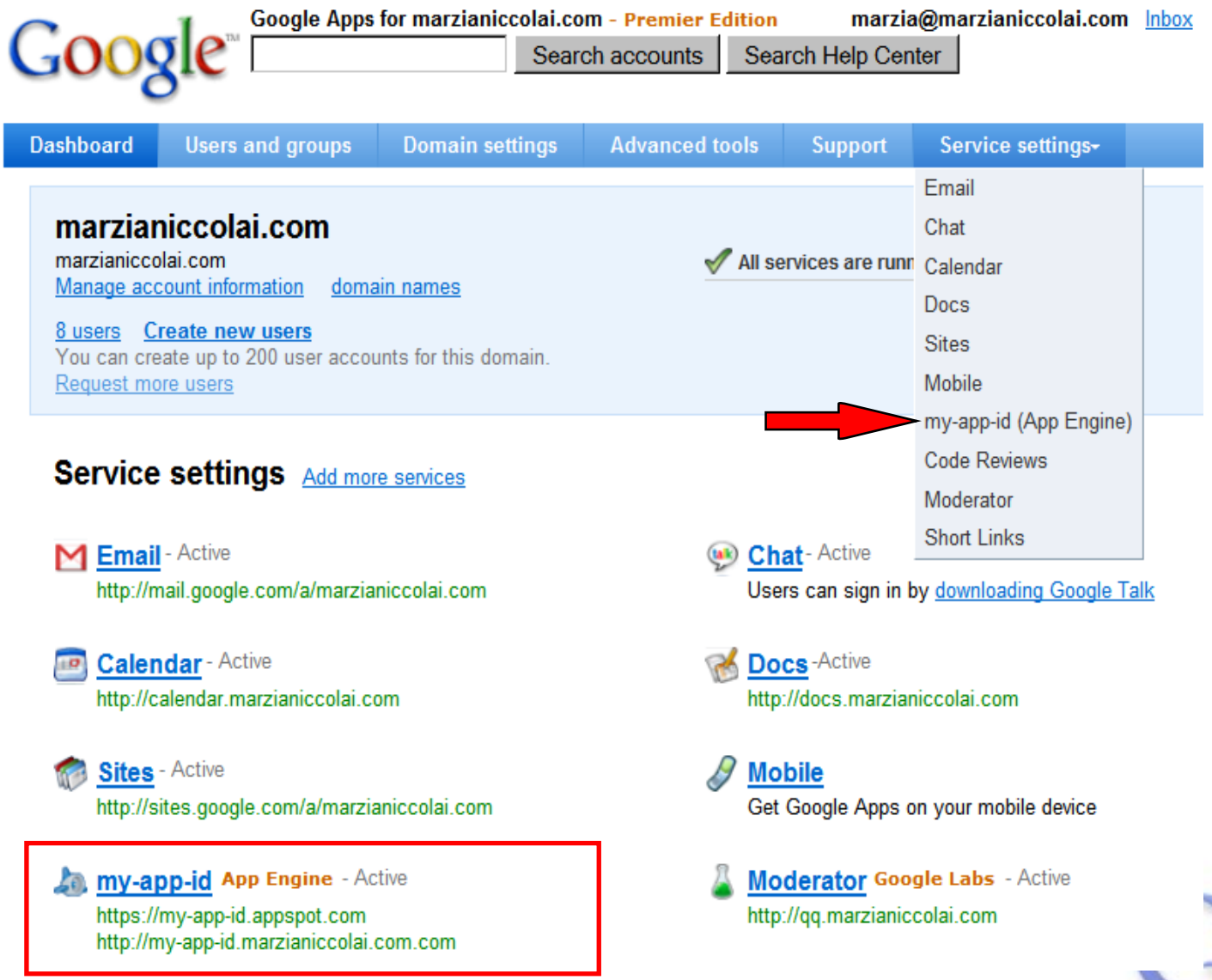
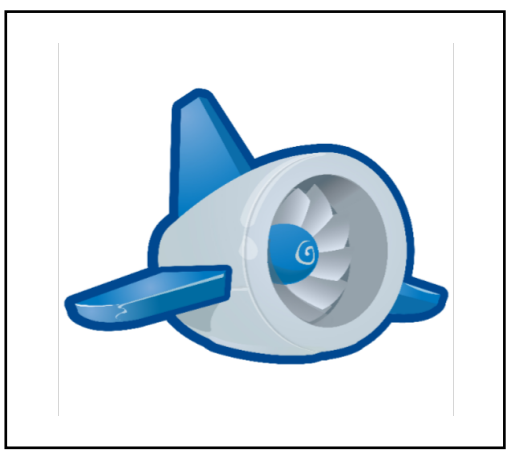
Google Apps + App Engine



Google Apps + your apps

Our Google Apps

Your custom applications



Google's scalable serving architecture

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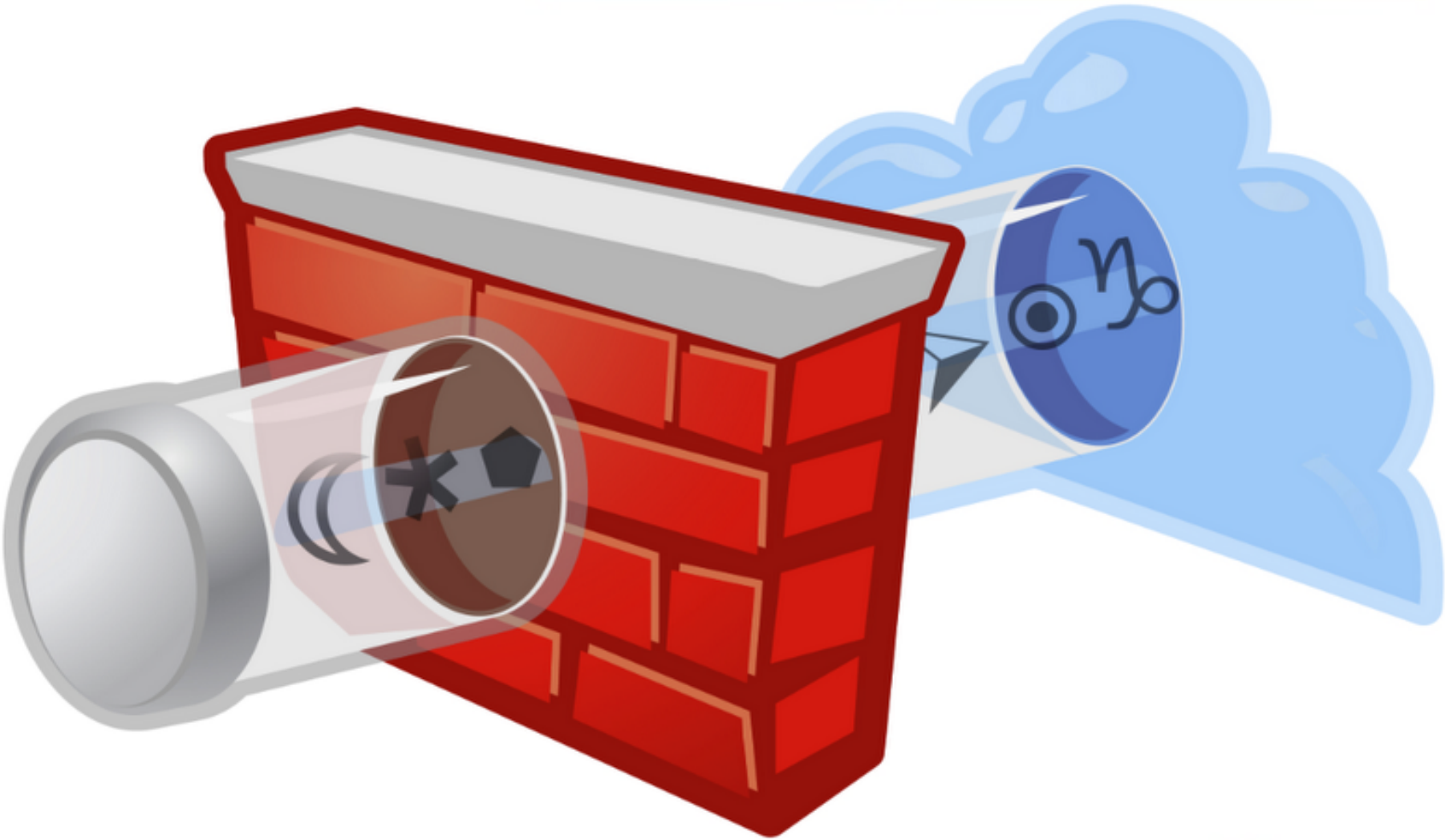
Database import

Secure Data Connector (SDC)



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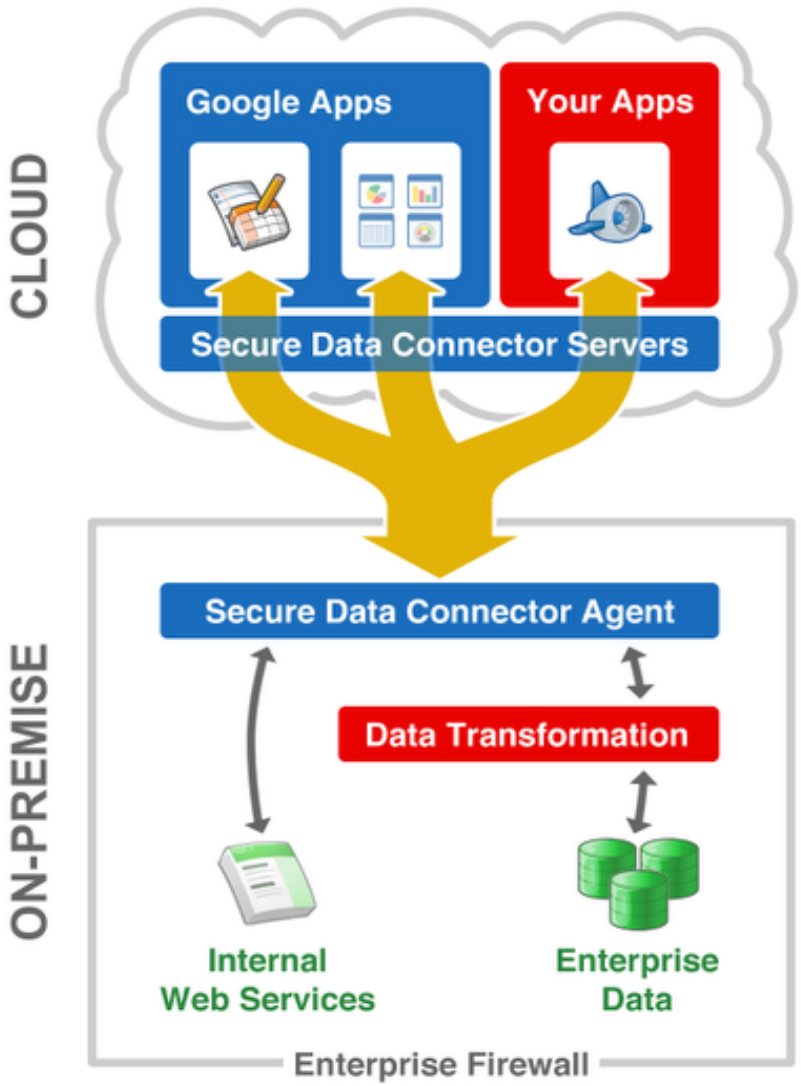
Secure Data Connector



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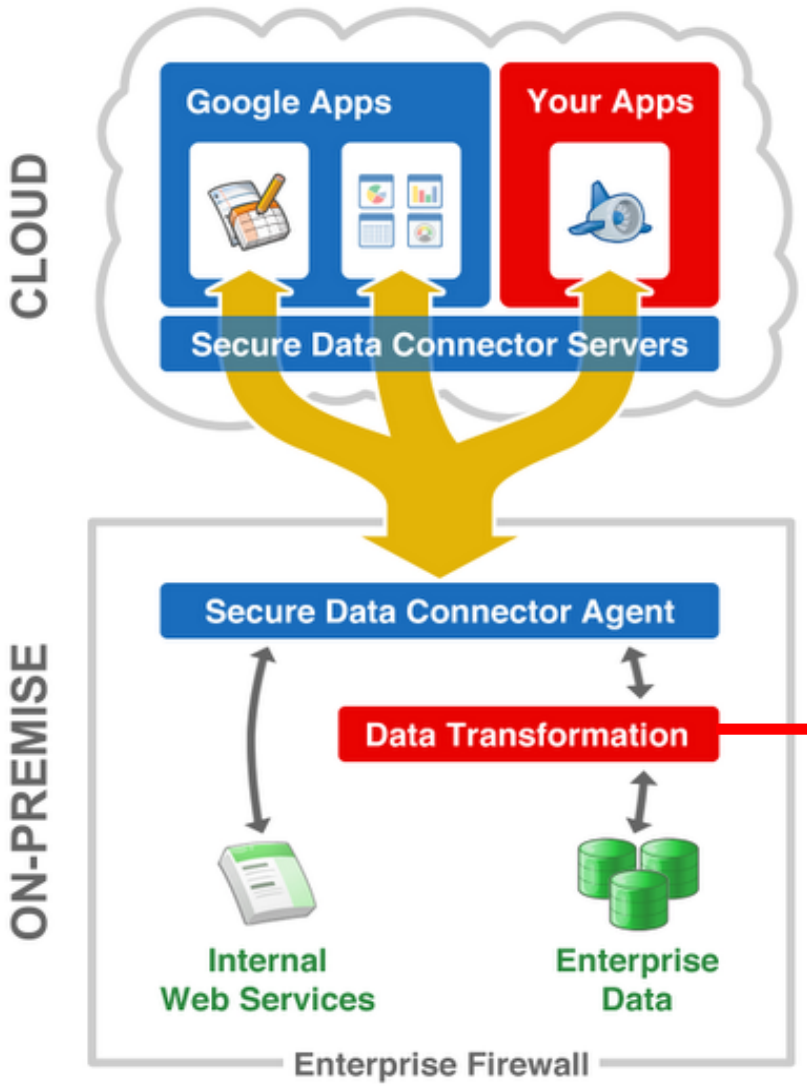
Secure Data Connector



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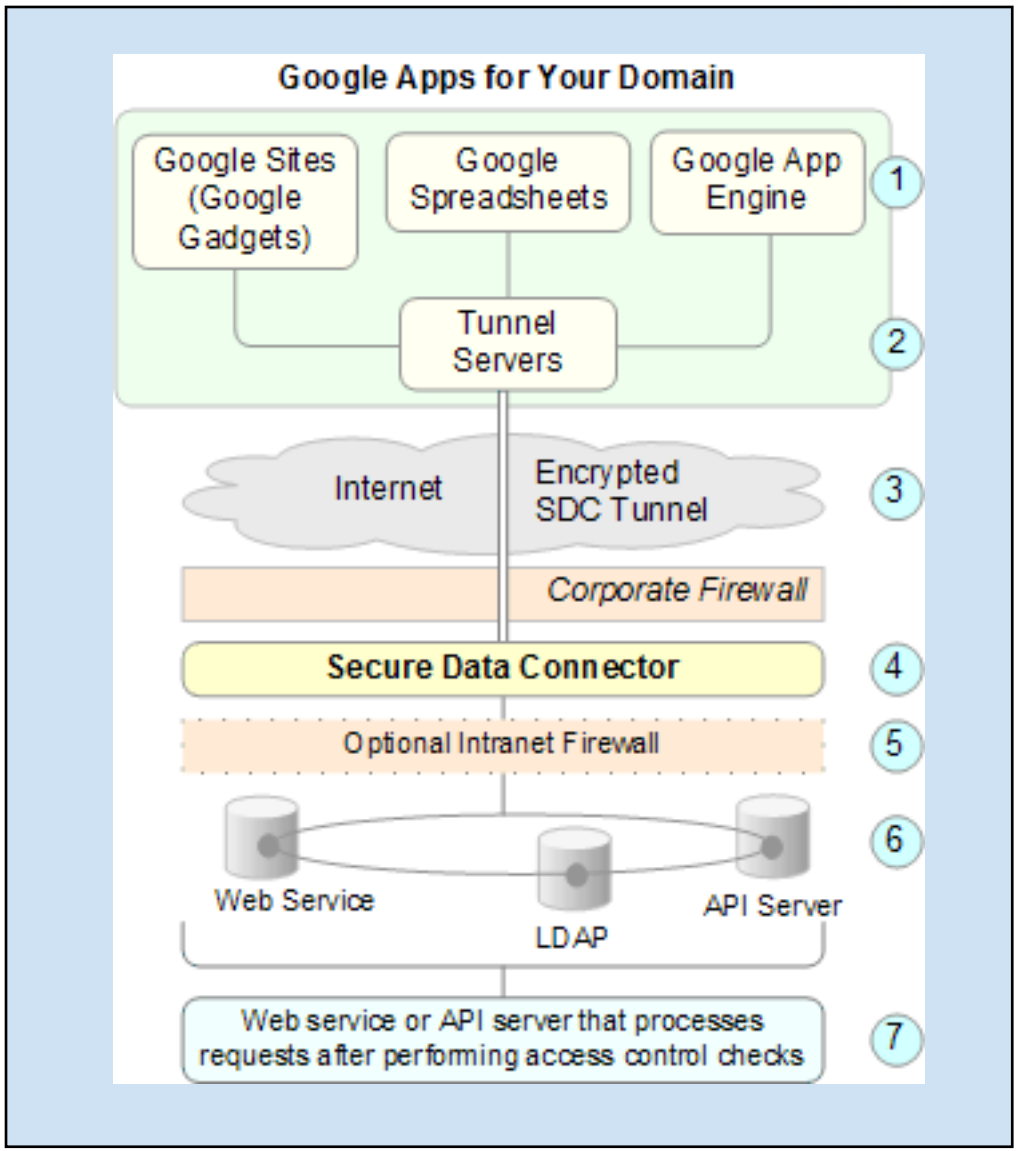
Using Secure Data Connector



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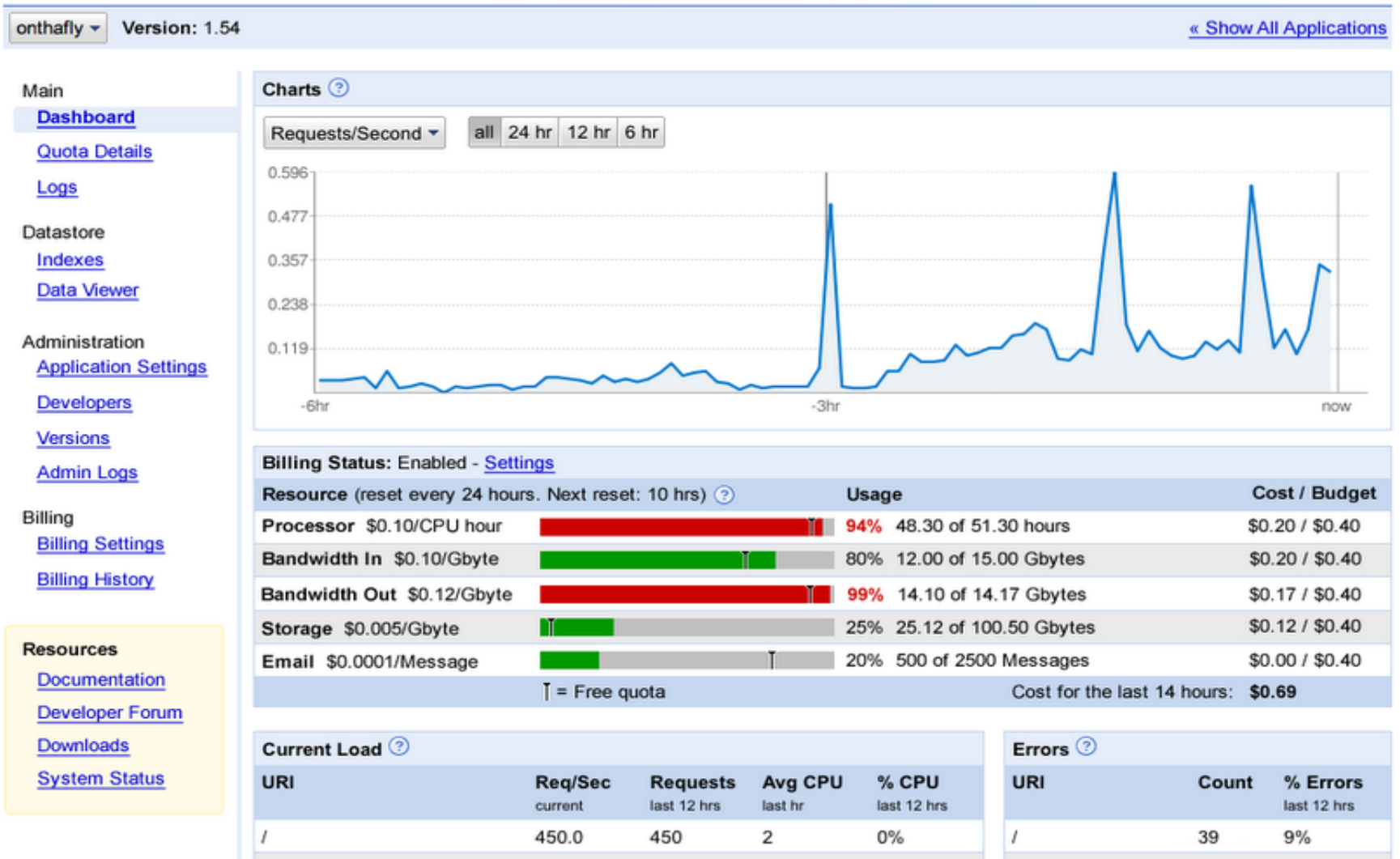
Your application's health



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App Engine's health history

Google App Engine

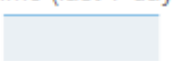
Help | Admin Console

System Status

Current Availability

100%

Uptime (last 7 days)



Read latency (today)

Write latency (today)

	03/20/09	03/21/09	03/22/09	03/23/09	03/24/09	03/25/09	03/26/09	03/27/09	Now
Datastore	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Images	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Mail	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Memcache	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Serving	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Urlfetch	✓	✓	✓	✓	✓	✓	✓	✓	Normal
Users	✓	✓	✓	✓	✓	✓	✓	✓	Normal

The following symbols signify the most severe issue (if any) encountered during that day. Click a symbol in the table above to view a day's performance graphs.

✓ No issues or minor performance issues ? Investigating ⚠ Service disruption ? Unknown

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Additional services / APIs

- URL Fetch
- Memcache
- Mail
- Images
- Google Accounts
- Cron support

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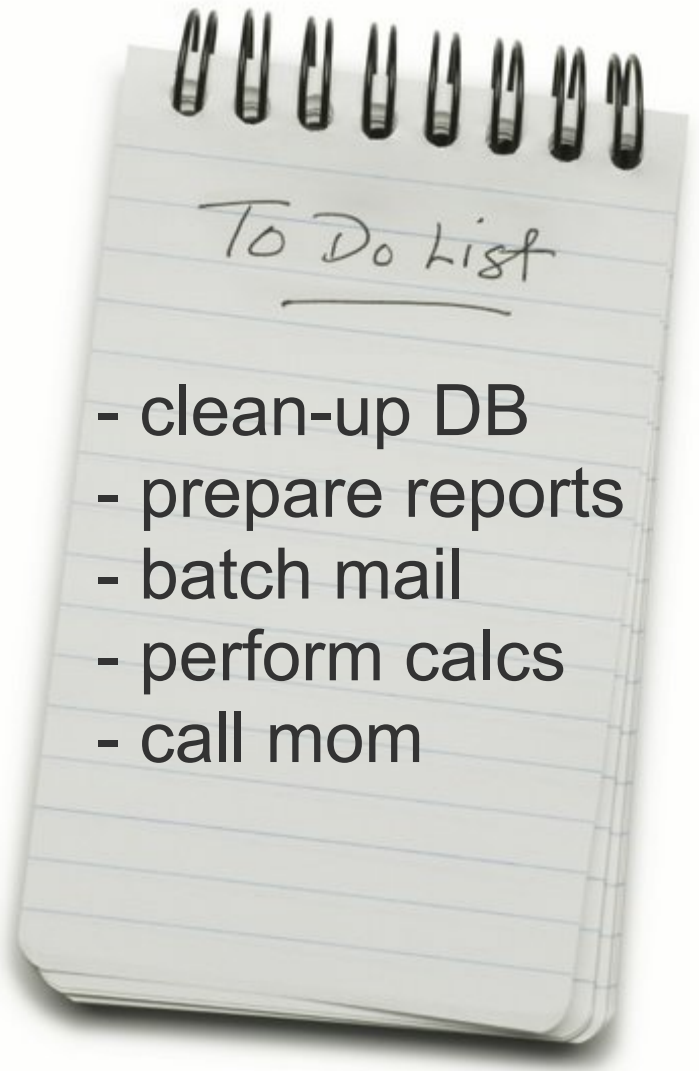
Cron Support



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Cron support

```
<?xml version="1.0" encoding="UTF-8"?>
<cronentries>
  <cron>
    <url>/recache</url>
    <description>Repopulate the cache every 2 minutes</description>
    <schedule>every 2 minutes</schedule>
  </cron>
  <cron>
    <url>/weeklyreport</url>
    <description>Mail out a weekly report</description>
    <schedule>every monday of month 08:30</schedule>
    <timezone>America/New_York</timezone>
  </cron>
</cronentries>
```

("every"|ordinal) (days) "of" (monthspec) (time)

every 5 minutes
every 12 hours
2nd,third mon,wed,thu of march 17:00
every monday of month 09:00
1st monday of sep,oct,nov 17:00

Java standards

APIs	Servlets	JSRs
Web App Container	Java Servlet	JSR-154
Datastore	JDO & JPA	JSR-220, JSR-243
HTTP	java.net.URL	Java SE
Mail	javax.mail	JSR-919
Memcache	javax.cache	JSR-107

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Scalable serving architecture

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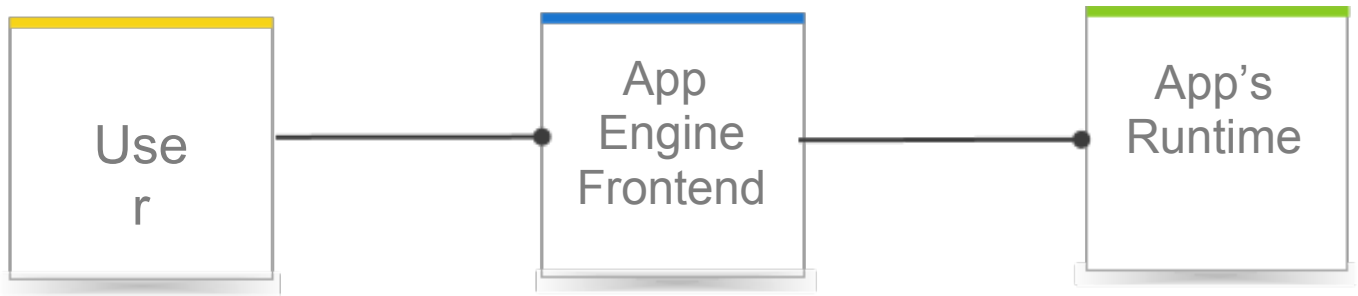
Request path



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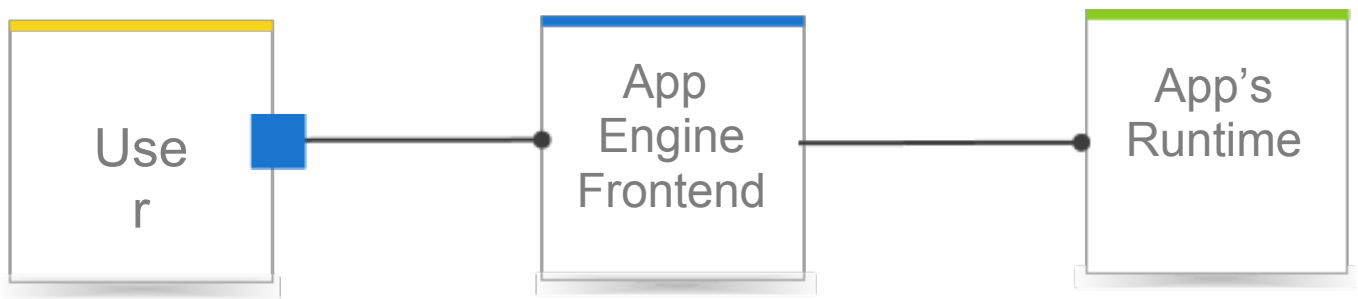
Request path



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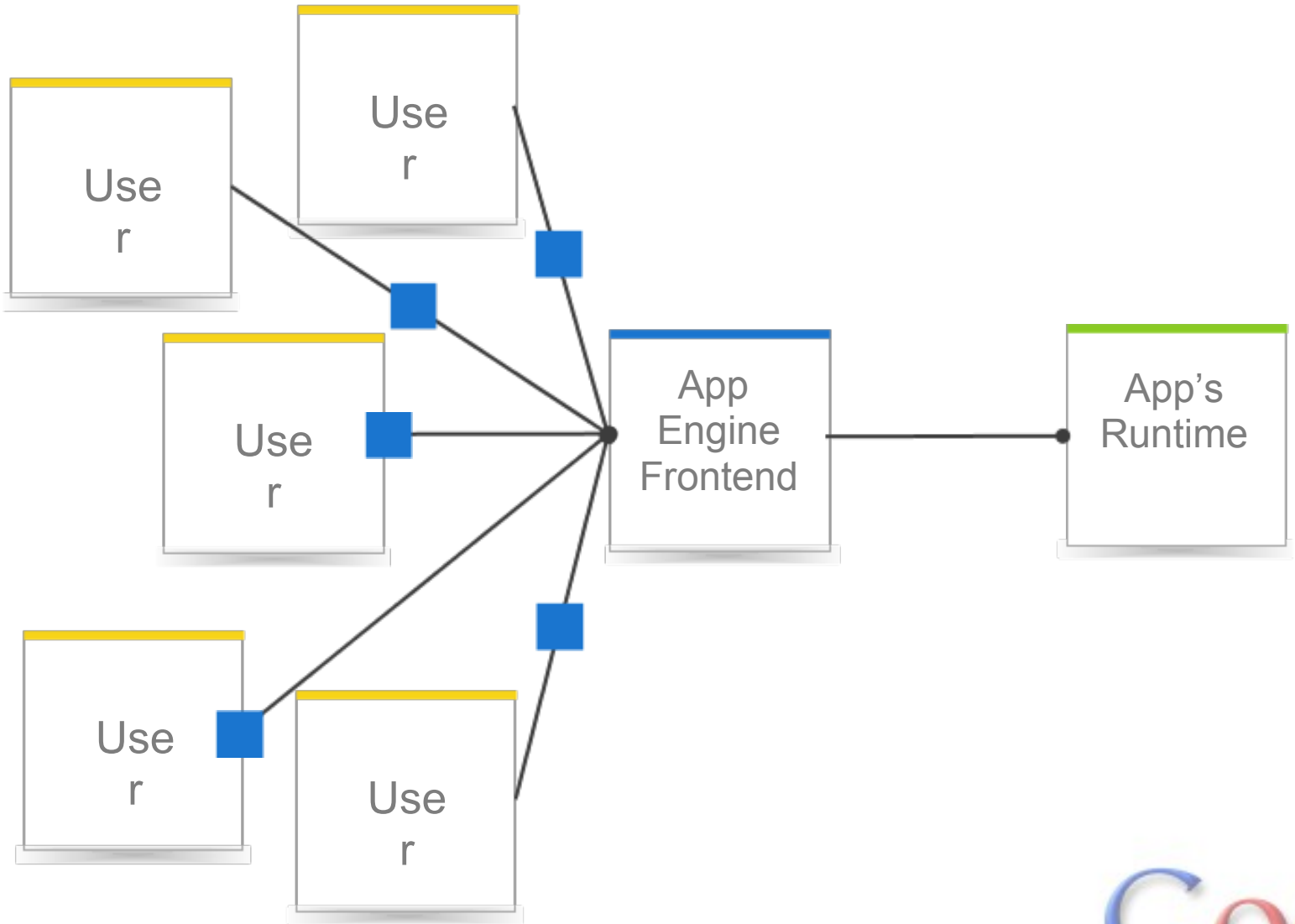
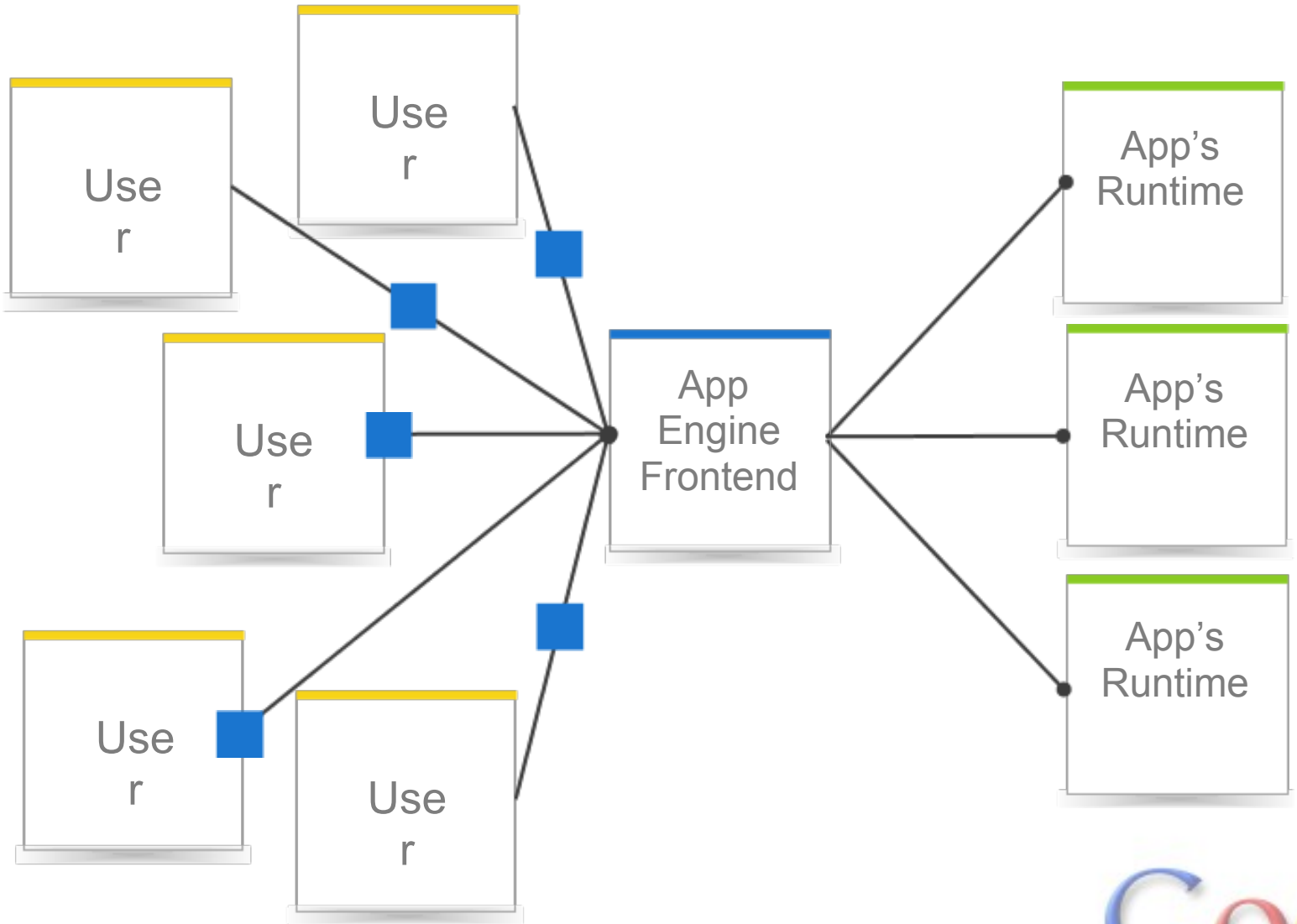
Request path



Google™

Request path



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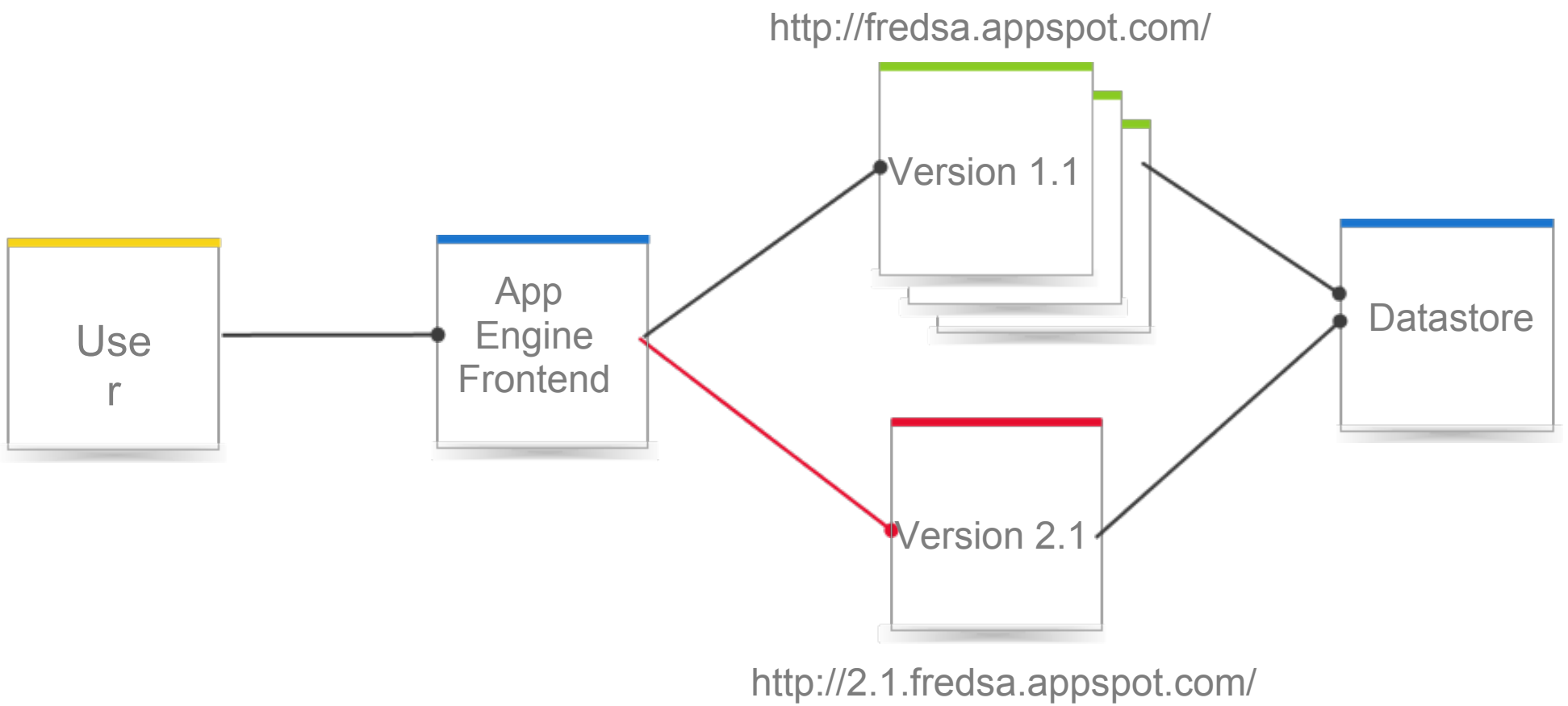
Multiple versions



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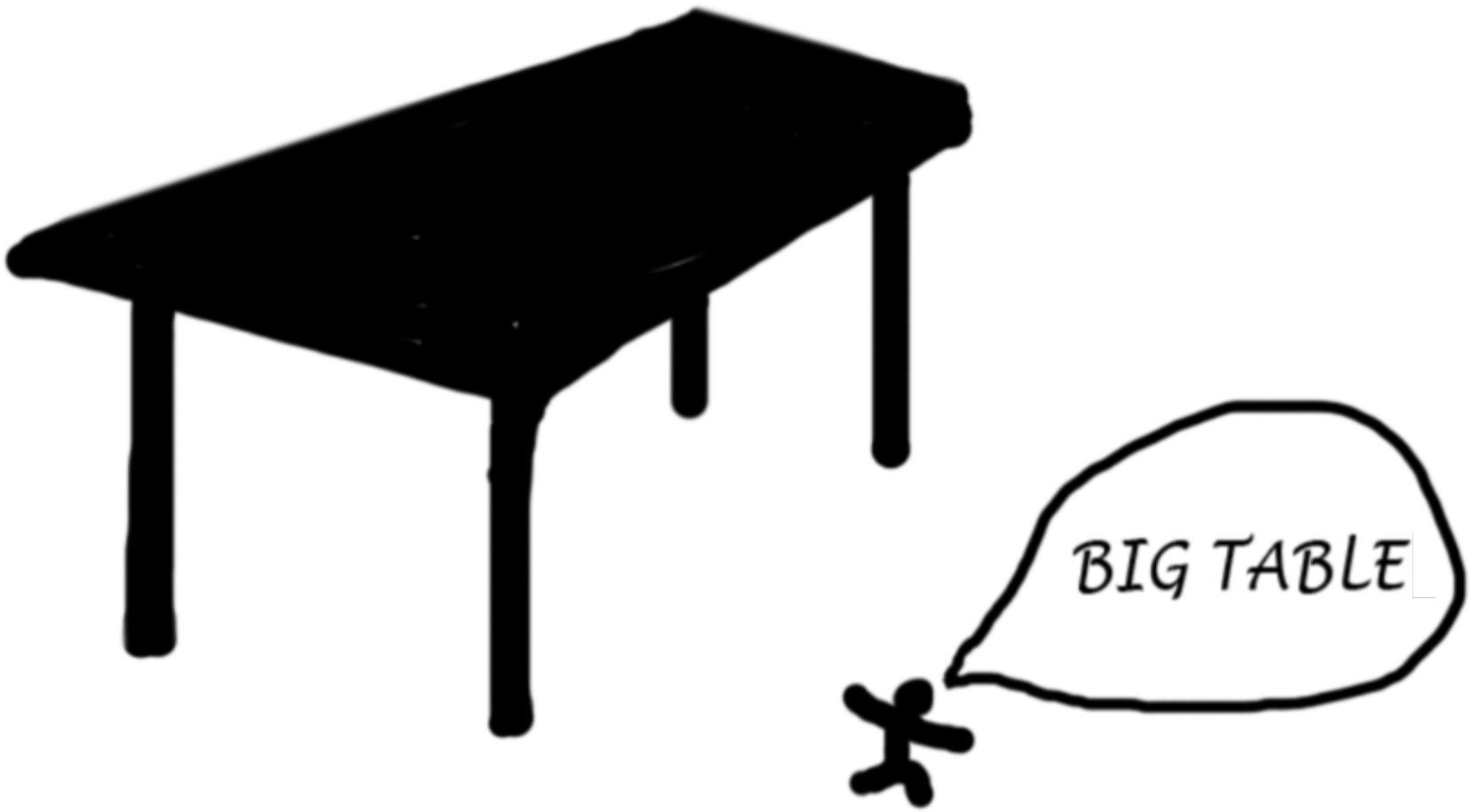
Distributed datastore



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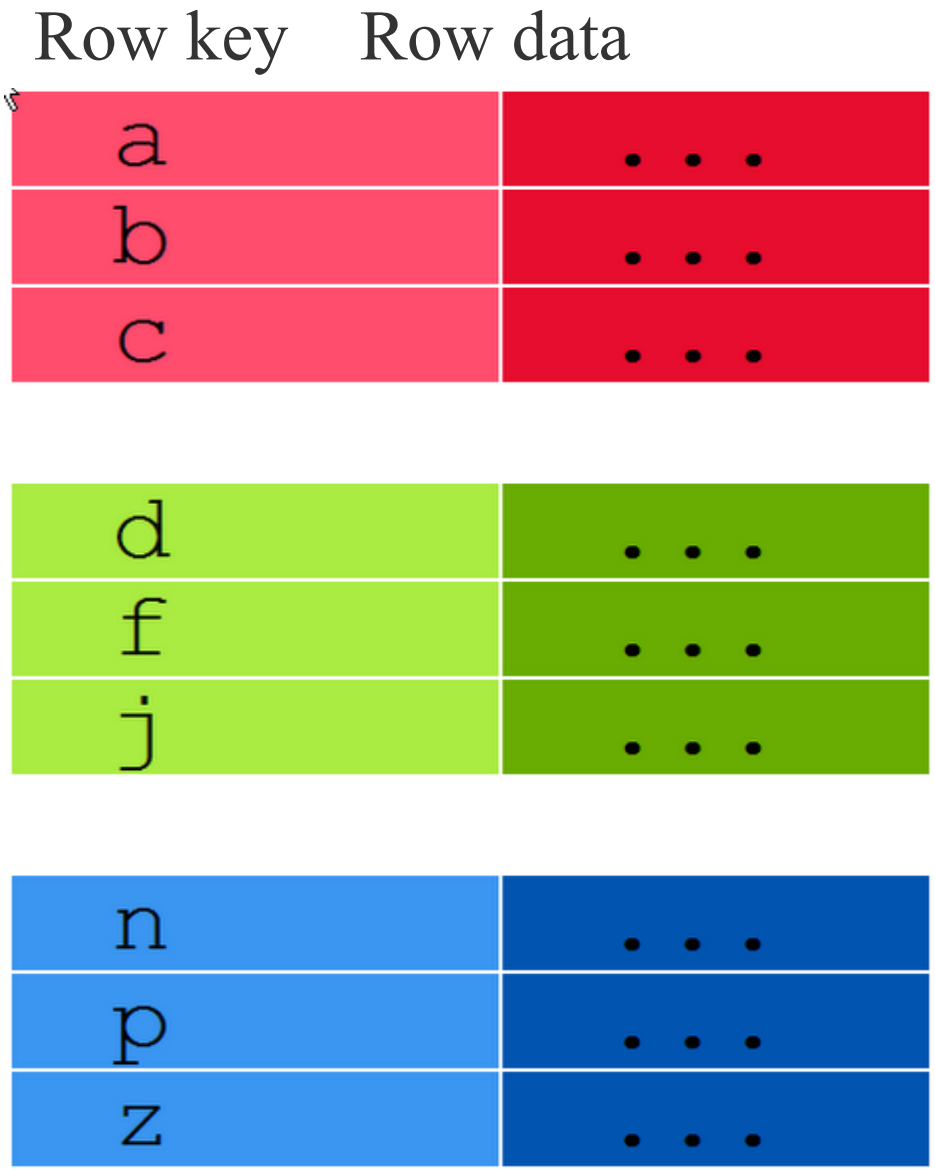
Bigtable : a sharded, sorted array



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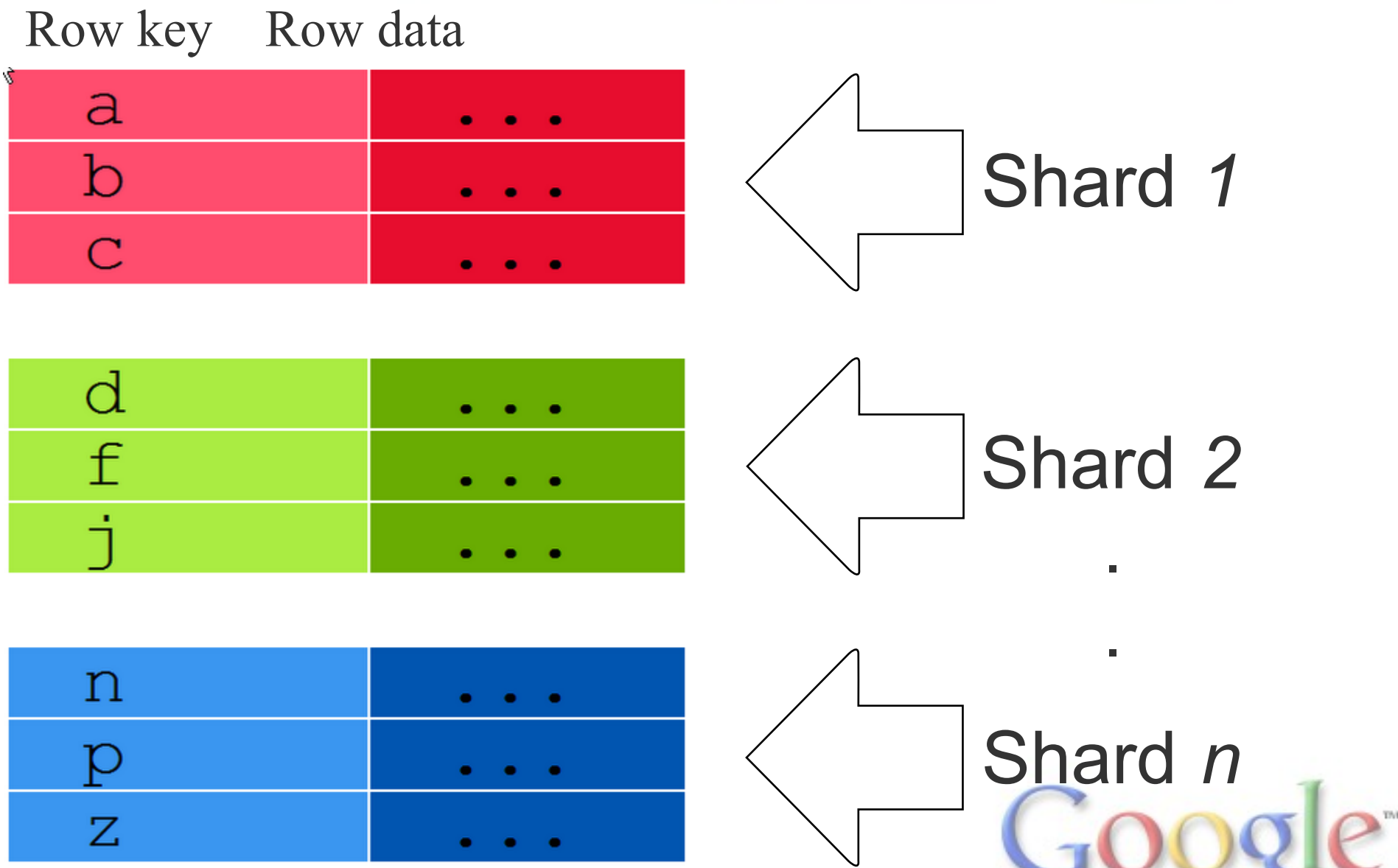
Bigtable : a sharded, sorted array



What's different?

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Datastore

- No joins
- Convert queries into *dense* index scans
- Optimistic concurrency
- ACID transactions

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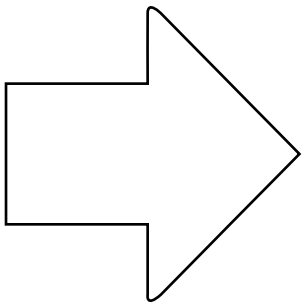
ACID

Atomic
Consistent
Isolated
Durable



Associative
Commutative
Idempotent
Distributed

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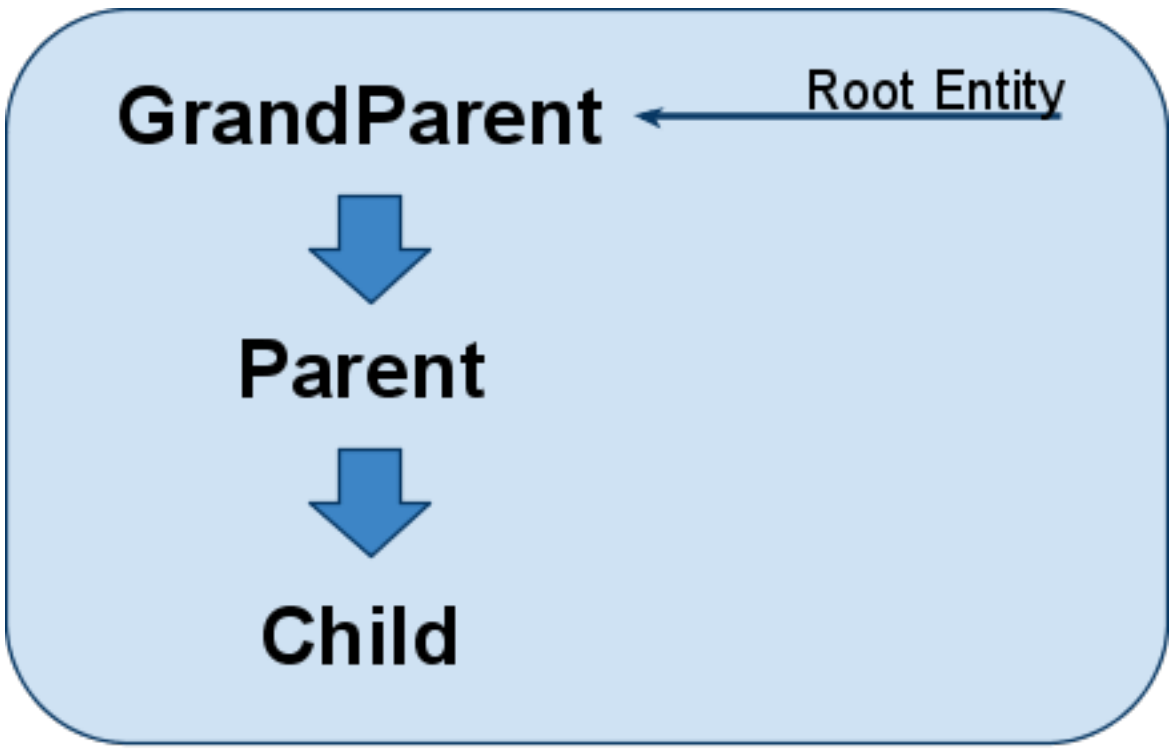
Entities & Keys

Entity key	Entity properties
/Child:Timmy	. . .
/Child:William	. . .
/Grandparent:Alice	. . .
/Grandparent:Alice	. . .
/Grandparent:Ethel	. . .
/Grandparent:Ethel	. . .
/Grandparent:Ethel	. . .
/Grandparent:Ethel	. . .
/Grandparent:Frank	. . .
/Parent:Sam	. . .
/Parent:Jane	. . .
/Parent:Jane	. . .
/Parent:Jane	. . .

Entity groups



Entity Group

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Entity keys (with ancestors)

```
/Grandparent:Alice
/Grandparent:Alice/Parent:Sam
/Grandparent:Ethel
/Grandparent:Ethel/Parent:Jane
/Grandparent:Ethel/Parent:Jane/Child:Timmy
/Grandparent:Ethel/Parent:Jane/Child:William
/Grandparent:Frank
```

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Datastore indexes

- Kind index
- Single property index
- Composite index
- Merge join

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Kind index

```
SELECT * FROM Grandparent
```

Scan with prefix `Grandparent`

Kind	Key
Child	Jimmy
Child	Timmy
Grandparent	Ethel
Grandparent	Fred
Parent	Jane
Parent	John
Parent	Todd

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Single property index

```
WHERE name = 'John'
```

Scan with prefix `Parent name John`

Kind	Name	Value
Parent	address	1 Palm Dr.
Parent	name	Alice
Parent	name	Bob
Parent	name	Brad
Parent	name	Chelsea
Parent	name	Jane
Parent	name	John
Parent	title	Ninja Pirate

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Composite index

```
WHERE lastname = 'Smith'
 AND firstname >= 'B' AND firstname < 'C'
```

Scan range [Parent Smith B, Parent Smith C):

Kind	lastname	firstname
Parent	Anderson	Jane
Parent	Barrett	Ryan
Parent	Smith	Bob
Parent	Smith	Brad
Parent	Smith	Chelsea
Parent	Thomas	Alice

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Merge join

Intersect results incrementally, using key:

Kind	Name	Value	Key
Parent	firstname	John	X
Parent	firstname	John	Y
Parent	lastname	Smith	Y
Parent	lastname	Smith	Z

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Datastore in flight

Transactions

- ACID - Atom, Consistent, Isolated, Durable
- Optimistic concurrency; serialized writes

Entity groups

- Hierarchy of entities
- Related data, transactions

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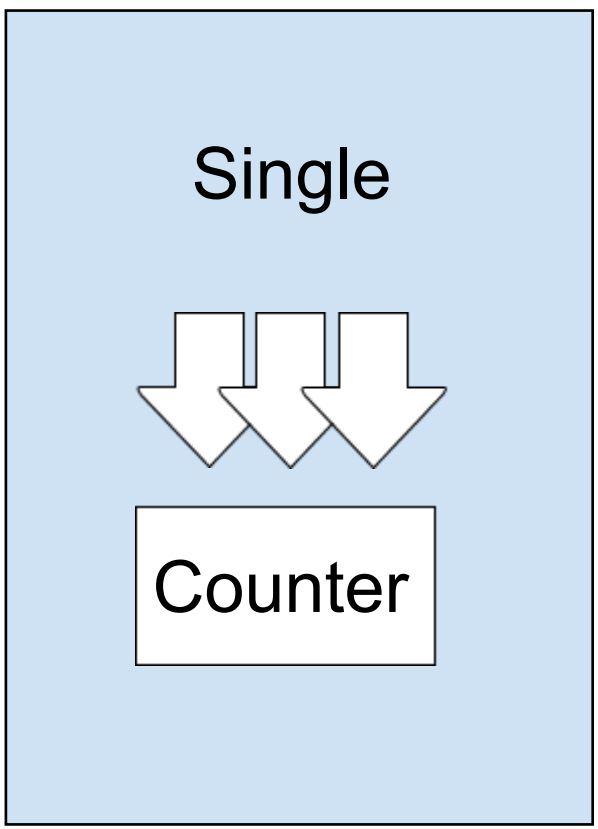
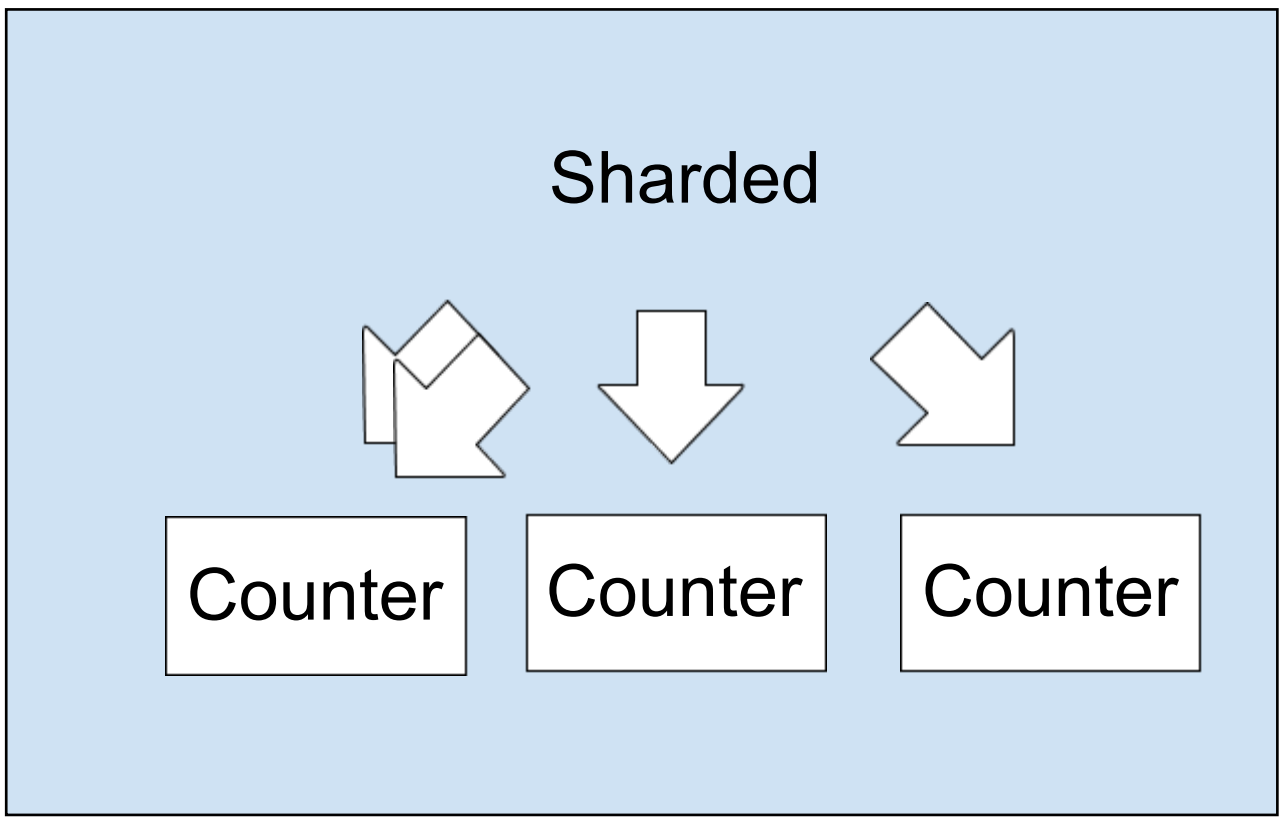
Sharding





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Roadmap

- Storing/serving large files
- Database export
- Task queues
- Incoming email
- XMPP API

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Wrap up

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Always free to get started

Free Quota

~5M pageviews/month

- 6.5 CPU hrs/day
- 1 GB storage
- 2,000 recipients emailed
- 1 GB/day bandwidth

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Purchase Additional Resources *

* free monthly quota of ~5 million page views still in full effect

App Engine in three bullets

Deploy your apps to a platform that is

- Easy to use
- Easy to scale
- Easy to manage

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Sign Up for Java!

http://appengine.google.com/promo/java_runtime

Google I/O

- Google's biggest developer event of the year
- May 27-28 in San Francisco
- Google App Engine, GWT and SDC sessions
- Direct interaction with the engineering team

http://code.google.com/io

Google

Thank you

Read more
http://code.google.com/appengine

Early look at Java
http://appengine.google.com/promo/java_runtime

Contact info
Fred Sauer
Developer Advocate
fredsa@google.com

Questions
?

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Appendix

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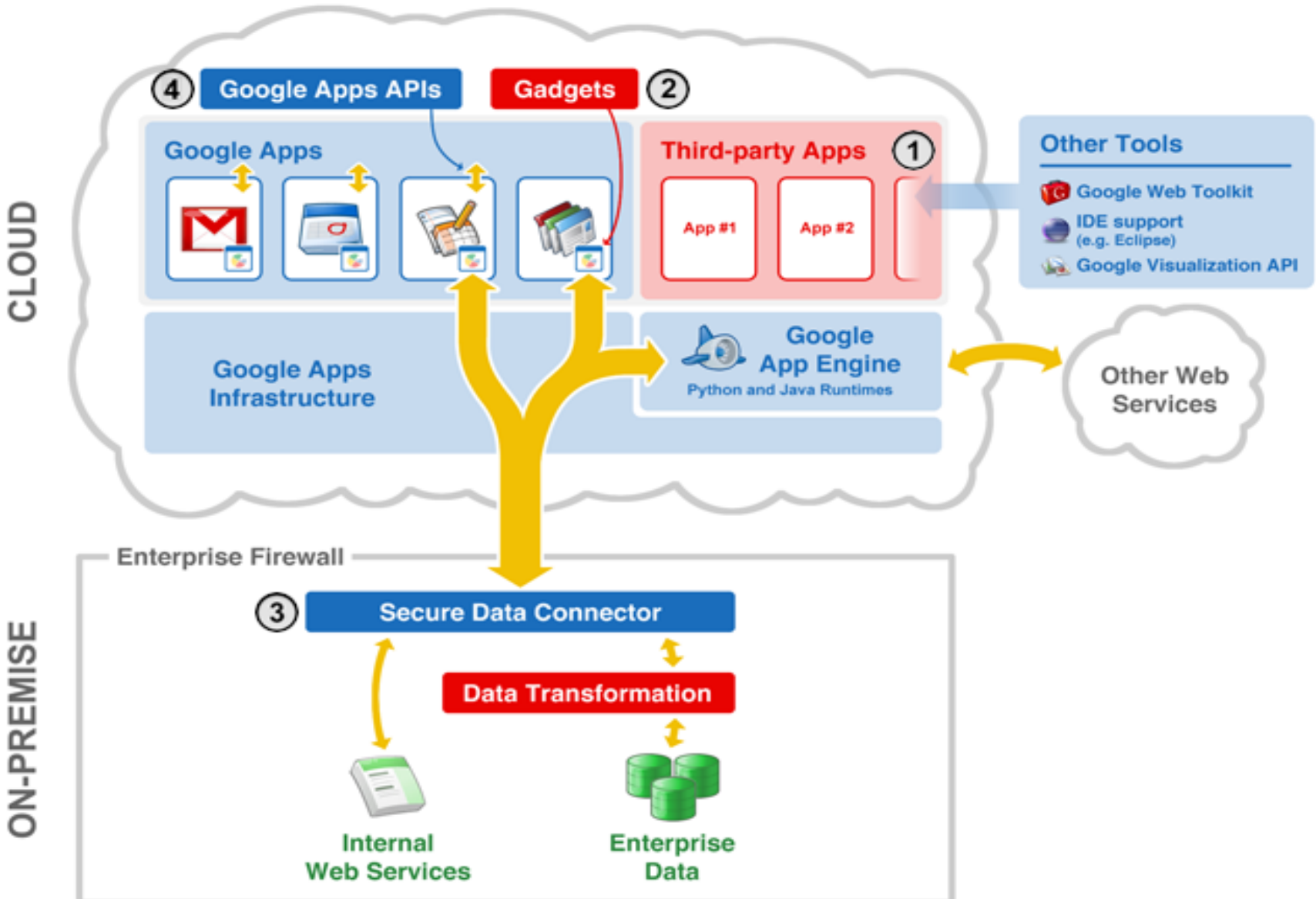
All together



Database import sample code

```
from google.appengine.ext import db

class Album(db.Model):
artist = db.StringProperty()
title = db.StringProperty()
publication_date = db.DateProperty()
length_in_minutes = db.IntegerProperty()
```

```
import datetime
 from google.appengine.ext import db
 import models

 class AlbumLoader(Loader):
 def __init__(self):
 Loader.__init__(self, 'Album',
 [('title', str),
 ('artist', str),
 ('publication_date', lambda x: datetime.datetime.strptime(x, '%m/%d/%Y').date()),
 ('length_in_minutes', int)
 ])
```

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A year in review

- apr - launch at Campfire One
- may - open sign-ups, Memcache & Images API
- jun - webapp, HTTP header and URL fetch docs
- jul - SDK 1.1.1, logs export
- aug - SDK 1.1.2, DL-able docs, batch write/delete
- sept - SDK 1.1.4, SDK 1.1.5
- oct - HTTPS support, product roadmap
- nov - SDK 1.1.6
- dec - status dashboard, quota details
- jan - SDK 1.1.8
- feb - billing, SDK 1.1.9, new file size limit (10 MB)
- mar - countdown to Campfire One...

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