Stories from the Trenches at GoDaddy

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Who am I?

• Felix Gorodishter
• Speak fluent Russian 😊
• Deving since ‘96
• With GoDaddy since ‘09
• Currently Principal Architect

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GoDaddy...

Our vision is to radically shift the global economy toward life-fulfilling independent ventures.

- 17.3 M Customers worldwide (56 markets)
- 75 M Domains under management
- 10 M Websites hosted / 24 Datacenters
- 18 B DNS queries daily
- 2 B Attacks blocked monthly
- 85 K Servers
- 7000 Employees
Data Flows

**Data Collection**
- SQL Stores:
  - MySQL
  - MSSQL
- NoSQL Stores:
  - Cassandra
- 3rd Party Systems
- GD Applications (Events, Logs, …)

**Data Platform**
- **Business Insights**
  - Google Analytics
  - Tableau
- **Batch Processing**
  - Scale out BI: Data Egress
  - Unified Data Set
  - Spark
  - Hadoop
- **Real-Time Processing**
  - Kafka
  - 3rd Party Systems
- **Elasticsearch**

**Data Serving & APIs**
- **Product Serving**
  - MySQL
  - Redis / Cache
  - Cassandra
- **Internal Viewing**
  - Elasticsearch

**Customers**
- **Marketing Omnichannel**
- **Products**
  - FOS / WSB / C3 / …
- **3rd Party Decision Engine**
- **Personalization (TMS) Decision Engine**
- **Customer 360 APIs**
- **Monitoring / Dashboards**

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11 PB Managed HDFS  
13 TB New data per day in HDFS  
200K Messages per second
Managed Elastic Stack

Managed Clusters: 61
Containers: 766
Indexed Data: 271 TB
What we did

• Wrote agents for Linux and Windows (in 2014)

• Agent exposed local port on every server so teams can natively ship data over HTTP (and UDP too)

```bash
curl -H "Content-Type: application/json" -X POST -d '{"fqdn":"\'hostname\'', "data":"felixtest"}' http://localhost:<PORT>/v1/foo/bar
```

• Data from hosts is WRITE-ONLY into pipeline
Data Collection – for Operations

Our Agent(s) – CPM (Collector Process Manager)

- Operations/SRE needed more primitives
- Built it to be pluggable – Python on Linux & C# .NET on Windows
- Always ship base meta-data about sender
- Allow for tail or scheduled workloads

Linux

- /var/log/* (known useful stuff)
- /etc/passwd
- /etc/group & /etc/login.groups
- /etc/yum.conf & /etc/yum.repos.d/*
- rpm –qa
- yum check-update

Windows

- Application – event log
- System – event log
- Security – event log

Per Message Meta-data

```
[gd-linux-system-collector]
type = private
dc = phx3
eq = staging
server_role = hypervisor
service_zone = phx-private-gen-zone-1
security_zone = mgmt
product_name = compute
```
If I were to do it today* ...

Evaluate open source tooling … it has improved tremendously!

* We’re currently evaluating tools
Winning Patching

Q: Are you patching?
A: Isn’t that just magic?
Patching – What is it?

- Measure and report on the compliance and risk of our server fleet
- Support static and ephemeral infrastructure
- Support Windows & Linux
- Provide transparency in the data and collection
- Give the raw data to the teams
- Leverage the same data for ops to exec reporting
Business Service Mapping (BSM)

We leverage 4 layers:

• Business Unit (BU)
• Product Line (PL)
• Business Service Rollup (BSR)
• Business Service (BS)
Patching

Once per hour, each host sends all available updates.
Patching: Tech Stack

Realtime via CDC

Platform Ingest
Proxy / kafka

Stores all streaming source data prior to processing.

HDFS

Transforms CPM data feeds into aggregates for reporting, and SNOW BSM into relational view.

Spark

Daily snapshots and current view of all data from sources. Accessible for anyone to integrate or query.

Hive

22 nightly jobs transform raw and aggregated data into report. Output to both Hive and Elastic.

Spark

Realtime: All Servers

Nightly ETL via Python

BSM CMDB

Corp Desktop Hosting PKI

Streaming: CPM

Data is exposed to everyone for real-time debug and reporting via dashboards and rich visualizations.

elasticsearch

kibana
RUM / User Events

Q: Isn’t that just GA?
RUM / User Events

Our JS – Traffic2

• 100% fidelity clickstream / event data
• Ability for teams to act quickly on streamed data
• Ability to join data to other datasets – ie. network monitoring / flow
• Support for our split testing & personalization frameworks
User Events

- Products track every aspect of customer interaction / lifecycle via Traffic2
- Recently started to analyze this via Elastic X-Pack ML
RUM - Facets / Findings

• Analyze by Source Geo → Datacenter → Page/Site
• 75th Percentile is most useful for ML on this dataset
• Top 1000 sites are interesting – but unique every hour/day
• We leverage Advanced ML job with aggregations:
  • date_histogram by 5m
  • terms agg top N
  • percentiles 75 for page load time (and other timings)
Business KPIs
GoCentral KPIs

• GoCentral team moves extremely fast – 13,500 code/config deployments in 2017
  • “If you don’t stop and look around once in awhile, you could miss it.” – Ferris Bueller

• Free trial product so we analyze by cohorts
  • If I bought January 1st, on January 14th I’ll be in the 14 day cohort

• Business level KPIs are trailing indicators
  • Activate – when customer setup the product they signed up for
  • Publish – when customer launches their initial website
  • Conversion – when customer switches from Free Trial to Paid
  • Auto Renew – whether account has auto-conversion enabled
PySpark Approach:

```python
## Build Dataset
1. df = df \
2. .withColumn('cohort_activate', \
3.     F.when((F.datediff(df.activate_date, df.signup_date) <= cohort), 1).otherwise(0)) \
4. .withColumn('cohort_end_date', F.date_add(df.signup_date, cohort))

5. df2 = df.groupBy(df.cohort).agg({"cohort_activate" : "avg"})

## Ingest into ES
6. df2.write.format("org.elasticsearch.spark.sql").mode("append").save("index/type")

## Ask ML to process
7. start_payload = {"end": latest_available_date}
8. requests.post(url + '/_xpack/ml/anomaly_detectors/' + job + '/_open')
9. requests.post(url + '/_xpack/ml/datafeeds/datafeed-' + job + '/_start', json=start_payload)
```

* This is a code fragment*
Create a new job

**Job Details**

**Analysis Configuration**

**Datafeed**

**Edit JSON**

**Data Preview**

**bucket_span**

1d

**summary_count_field_name**

record_count

**categoryization_field_name**


**Detectors**

**cohort_activate**

\[
\text{mean(cohort\_activate) by cohort}
\]

**Add Detector**

**Influencers**

- cohort
- doc_id\_keyword
- free_trial\_signup\_string\_keyword
- record_count

Custom influencer

**Add**
GoCentral KPIs

- Model Plot FTW!
<table>
<thead>
<tr>
<th>Key Learnings</th>
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<tbody>
<tr>
<td><strong>Hardest part is your data</strong></td>
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<tr>
<td>Bulk of projects was spent figuring out what data was actionable versus vanity and formatting to take best advantage of ML.</td>
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<tr>
<td><strong>Business likes model plots</strong></td>
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<tr>
<td>The visualization with a model-plot is extremely convincing / powerful. Use it where you can afford.</td>
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<tr>
<td>* Advanced jobs require JSON config!</td>
</tr>
<tr>
<td><strong>Alerting / Watcher is Hard</strong></td>
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<tr>
<td>Plan to spend time on watcher configuration, especially for advanced notification. Its getting better, but still more to do.</td>
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<tr>
<td><strong>Make data ingest idempotent</strong></td>
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<tr>
<td>Leverage custom document _id field so you can reload same data easily.</td>
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<tr>
<td>(Applies to Hive &amp; other data stores - eg. ability to overwrite a full partition)</td>
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<tr>
<td><strong>Advanced jobs are your friend</strong></td>
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<tr>
<td>We found ourselves running most ML workloads on Advanced jobs due to their power in configuring and enabling model plot (see below).</td>
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<td><strong>You will try &amp; retry jobs</strong></td>
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<tr>
<td>Tooling is powerful, but figuring out the right mix of detectors, influencers, etc is dataset specific. Set aside a sprint or two for this.</td>
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<td><strong>Have a strategy for data gaps</strong></td>
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<tr>
<td>There are times real-time data will stop flowing. Have a strategy for how you will deal with gaps.</td>
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<tr>
<td><strong>Leverage the Elastic team</strong></td>
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<td>We’ve had an incredible relationship with the Elastic team.</td>
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But wait, there’s more!

- Replaced our SIEM with Elastic + Hadoop
- Monitoring & Alert Correlation / Analysis
- Team Metrics: CICD Pipelines / Code Health / Etc.
- Fleet-wide Meltdown / Spectre Analysis

We can’t wait for...

Elastic APM
Guess what .... We’re hiring!

x.co/jobplz | godaddy.com/jobs

Arizona, California (SD, LA, SF, Sunnyvale), Iowa, Massachusetts, Washington, and more!

Questions?

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