Shopping Event Reliability

SREcon16

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• **Architect, SRE team, Baidu Nuomi, China**
  – Baidu Nuomi (Local Life O2O Service Platform)

• **Areas of focus**
  – Infrastructure: distributed computing/storage/scheduling
  – Performance
  – Reliability
  – Capacity

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Agenda

• Introduction
• The Challenges of SER
• Practice of SER
• What we learned
Introduction: Baidu Nuomi

• Nuomi (糯米) means sticky rice in Chinese

• Local Life O2O Service Platform
  – Food, Movie, Hotel, Takeaway, Tourism, Ticket, Home Services ...

• Spiral-Up Business
  – Millions of orders per day
  – Hundreds of millions of GMV per day
Introduction: Shopping Events of Nuomi @2015

*Shopping event* is a most significant marketing approach in China. It is just like a war for SRE *nearly every month.*

- **Mar., Girls' Day**
- **May., Chowhound Day**
- **Jun., 5th Anniversary**
- **Aug., Chinese Valentine's Day**
- **Oct., Mid-Autumn Festival**
- **Nov., Singles’ Day**

GMV/DAU
The Challenges

- Much More **User Traffic**
- Much More **Seckill**

- Much More **Different Engineers**
- Much More **Marketing Events**

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![Graph showing user traffic and shopping event](image-url)
Overview: SRE FOR SER

1. Traffic Control
   - Overload Protection
   - Graceful Degradation

2. Capacity Management

3. Monitoring

4. Multi-homed Systems

5. Process Management
   - Standardization Exercise
1. Practice of Traffic Control
Practice of Traffic Control—Overload Protection

- **Avoid Avalanche**
- **Handling Overload**
  - Native app-side throttling
  - **Global Protection** (BFE)
  - Service Protection
  - Database Protection
  - Other Platform
- **Based**
  - Utilization of resource
  - Active state of CPU
  - Quota of QPS
  - Receive buffer
Practice of Traffic Control—Graceful Degradation

**Flexible Reliability**
- Grade and decouple the features
- Independent seckill service

**Static environment**
- Old service and data mirror image
- Simple, Independent, Automatic, **Keep high hit rate**

**Comfortable Notice**
- Be used in service failures widely
- Simple, Independent, Automatic
2. Practice of Capacity Management
Practice of Capacity Planning

Scenario-Based Shopping Event Capacity Planning

- Marketing Event Scene
- Customer behavior Scene

Capacity Indicators

<table>
<thead>
<tr>
<th>Business Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active users</td>
</tr>
<tr>
<td>QPS</td>
</tr>
<tr>
<td>GMV</td>
</tr>
<tr>
<td>The number of coupons</td>
</tr>
<tr>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service Level Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency</td>
</tr>
<tr>
<td>Reliability</td>
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Load Testing

Load Testing Tools

- Simulation tool: read and write, independent
- Playback tool: historical request data
- Data collection tool: hardware (utilization) & software (SLOs)

Capacity Model

- Correlation analysis
- Finding Minimum water level
Practice of Elastic Container Infrastructure

- Baidu Auto Scaling Strategy (BAS@Baidu)
- Online Runtime Platform (ORP@Baidu)
- Global resource management (Matrix@Baidu)
- Containers in Datacenters
### 容量管理

<table>
<thead>
<tr>
<th>单号</th>
<th>名称</th>
<th>状态</th>
<th>创建时间</th>
<th>container数</th>
<th>操作</th>
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<tbody>
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<td>nj1</td>
<td>-</td>
</tr>
</tbody>
</table>
3. Practice of Monitoring
Monitoring ALL Events During Shopping Event

- **Infrastructure Failure Events:**
  - Country
  - Region
  - Cluster
  - Network
  - Rack
  - Machine

- **Configuration Events:**
  - Product
  - Subsystem
  - Module
  - Service
  - Instance

- **Deploy Events:**
  - Deploy marketing strategy
  - Continuous Deployment

- **Dependent Platform Events:**
  - passport
  - redis
  - Nuomi
  - nmq
  - mysql

- **Key Indicators Abnormal Events:**
  - Latency
  - Traffic
  - Errors
  - Saturation
Event-Flow Graph

Key Indicators
Abnormal Events

Time-varying events

Deploy Event
Configuration Event
4. Practice of Multi-homed Systems
Multi-homed Systems

Latency < 10ms

Customer

Unit 1
Service
Redis master
DB master
Redis slave

Unit 2
Service
Redis slave
DB slave

Latency > 30ms

Customer

Unit 3
Service
Redis master
DB master
Redis slave

Unit 2
Service
Redis slave
DB slave

Unit 1
Service
Redis master
DB master
Redis slave

Unit 3
Service
Redis master
DB master
Redis slave

Customer
5. Practice of Process Management
Standardization

- **Before Event**
  - Marketing Forecast
  - Capacity Planning
  - Failure Drill
  - Deploy Restrict
  - Auto-Scaling (Out)

- **During Event**
  - On-call in Operation Center

- **After Event**
  - Auto-Scaling (In)
  - Data Review
  - Postmortem
What we learned

**Traffic Control**
- Both over *protection and graceful degradation* are important because there are a lot of unpredictability in shopping event

**Capacity Management**
- **Scenario-Based**
- Considering business objectives and SLOs
- Collecting data of hardware (utilization) & software (SLOs)
- Using historical request data

**Monitoring**
- Monitoring all events in shopping event
- Building an *event-flow graph*

**Multi-homed Systems**
- Unitized

**Process Management**
- Standardization
- On-call in operation center
Thank You!

“This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning.”
-Winston Churchill