Handling large volumes in NDC Shopping

An airline IT provider’s perspective

Montreal, May 20th - 22nd 2019
Implementation Considerations

- **Load**
  - Aggregators, meta searchers and other NDC partners produce a high transaction volume
  - Result sets may be very large
  - Partners expect quick response times
  - Implementation must handle fluctuating loads
  - Infrastructure costs should be acceptable for systems & network

- **Flexibility in offer construction**
  - OW vs. RT fares
  - Corporate fares
  - Personalized fares
  - Temporary promotions

- **Accuracy of offers**
  - Availability
  - Price accuracy
Example – AirShopping Result

Result may contain a large number of offers, especially if roundtrip fares are used and combined.
AirBroker NDC Offer Construction

- Cache handles main NDC load
- AirlineProfile delivered to partners
  - Contains available journeys (O&Ds)
  - reduce unnecessary requests
- Requests are processed in three steps
  - Check if journey is valid
  - Check applicable routes and availabilities for journey
  - Pricing of available offers

- Legacy systems send updates real time or frequently
  - Timely and correct updates plus real time processing directly affect quality of cache
- PSS is not affected from NDC Shopping load
Reduce transactions by implementing AirlineProfile

- Some connected partners are requesting continuously unavailable routes
  - A high percentage of results may be empty

- Implementing the airline profile helps to reduce load
  - Supports partners in reducing the number of useless requests
  - Reduces number of unnecessary transactions to be processed by the airline

```
<?xml version="1.0" encoding="UTF-8"?>
<SourceFile>
  <DataItems ActionType="Availability" SequenceNumber="0">
    <OfferGeoSpecification>
      <OfferOriginPoint>
        <GeoSpecCode GeoSpecCodeType="P">NTE</GeoSpecCode>
      </OfferOriginPoint>
      <OfferDestinationPoint>
        <GeoSpecCode GeoSpecCodeType="P">BHD</GeoSpecCode>
      </OfferDestinationPoint>
    </OfferGeoSpecification>
    <OfferGeoSpecification>
      <OfferOriginPoint>
        <GeoSpecCode GeoSpecCodeType="P">NTE</GeoSpecCode>
      </OfferOriginPoint>
      <OfferDestinationPoint>
        <GeoSpecCode GeoSpecCodeType="P">MAN</GeoSpecCode>
      </OfferDestinationPoint>
    </OfferGeoSpecification>
  </DataItems>
</SourceFile>
```

Schema 17.2
Practical Sample Of Airline Profile Use

<table>
<thead>
<tr>
<th>Total Transactions</th>
<th>Success</th>
<th>Error</th>
<th>Error Percentage</th>
<th>Average Response Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>87,862,231</td>
<td>32,574,544</td>
<td>55,287,687</td>
<td>62.93</td>
<td>29</td>
</tr>
</tbody>
</table>

High error quota („offer not found“) before use of AirlineProfile until end of March 2019

Greatly reduced error quota after implementation of AirlineProfile with beginning of April 2019

Noticably lower total number of transactions and system load
Reduce NDC Network Load With Compression

- Most web application servers that are typically used to serve NDC implementations support compression.

- Compression reduces response size dramatically:
  - AirShoppingRS size can be reduced between 90% and 96%, depending on result size.
  - AirlineProfileRS can be reduced by ~97.5%.

- Compression reduces network bandwidth:
  - Improves delivery speed of large responses.
  - Can reduce external network costs.

- Increase of CPU power may be needed, effect on costs depends on individual infrastructure.
Load Peaks

- Typical daily transaction distribution 0:00-24:00
  - Peak hours show >4 times more transactions than hours with low load

- Typical, daily load between low booking period Nov/Dec and high booking period in January
  - Difference between low booking season and peak is clearly visible
  - In addition there is a continuous load difference per weekday
  - Difference between days with lowest volume and peak days is x2.5

- Depending on date and time the infrastructure requirements differs by more than factor 10

- Connecting additional distribution partners can increase volume strongly
Managing Load Peaks In A Cloud Environment

- Automatic horizontal scaling within defined limits
- Depending on application architecture scaling can be done per layer or service
- Continuous adjustment of resources
- Permanent monitoring
- Ways to optimize cost
  - Based on provider, location of servers, long term vs. on demand usage, different pricing options are available
  - Suitable combination depends on own implementation
  - Optimized mix can reduce data center costs
Summary

- NDC can produce much higher transaction load on the airline systems than traditional distribution channels
- Cache solution can protect legacy systems from unwanted load
- NDC AirlineProfile can help to reduce request load and improve quality
- Compression reduces network load and response time
- Dynamic scaling of servers can reduce data center costs