Handling large volumes in NDC Shopping

An airline IT provider`s perspective

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pribas airline solutions GmbH
Valterweg 24-25
D-65817 Eppstein-Bremthal

pribas Turkey Ltd.
Akdeniz University
Teknokent Ulugbey
AR-GE Binasi K:1 No:11
TR-07058 Campus ANTALYA

https://www.pribas.com

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

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Example – AirShopping Result

- Result may contain a large number of offers, especially if roundtrip fares are used and combined

Flights

Outbound							Inbound							ECONOMY
DUS	EXT	170519	10:10	13:25	BE7212	ALLIN	EXT	DUS	240519	14:55	20:05	BE7217	ALLIN	EUR 2909.76
DUS	EXT	170519	10:10	13:25	BE7212	JUSTFLY	EXT	DUS	240519	14:55	20:05	BE7217	JUSTFLY	**EUR 501.76**
Outbound							*Inbound*							
DUS-MAN	*BE7212*	*170519*	*10:10*	*11:00*	*operated by BE*		*EXT-MAN*	*BE375*	*240519*	*14:55*	*16:05*	*operated by BE*		
MAN-EXT	*BE374*	*170519*	*12:20*	*13:25*	*operated by BE*		*MAN-DUS*	*BE7217*	*240519*	*17:35*	*20:05*	*operated by BE*		
ADULT x 2	*tot 250.88*	*net 141.96*	*fee 108.92*				*ADULT x 2*	*tot 250.88*	*net 141.96*	*fee 108.92*				
DUS	EXT	170519	10:10	13:25	BE7212	JUSTFL...	EXT	DUS	240519	14:55	20:05	BE7217	JUSTFL...	EUR 653.76
DUS	EXT	170519	10:10	13:25	BE7212	GETMO...	EXT	DUS	240519	14:55	20:05	BE7217	GETMO...	EUR 815.76
DUS	EXT	170519	10:10	13:25	BE7212	ALLIN	EXT	DUS	240519	06:40	12:25	BE7213	ALLIN	EUR 2909.76
DUS	EXT	170519	10:10	13:25	BE7212	JUSTFLY	EXT	DUS	240519	06:40	12:25	BE7213	JUSTFLY	EUR 473.76
DUS	EXT	170519	10:10	13:25	BE7212	JUSTFL...	EXT	DUS	240519	06:40	12:25	BE7213	JUSTFL...	EUR 625.76
DUS	EXT	170519	10:10	13:25	BE7212	GETMO...	EXT	DUS	240519	06:40	12:25	BE7213	GETMO...	EUR 787.76
DUS	EXT	170519	10:10	13:25	BE7212	ALLIN	EXT	DUS	240519	10:25	16:40	BE7215	ALLIN	EUR 2909.76
DUS	EXT	170519	10:10	13:25	BE7212	JUSTFLY	EXT	DUS	240519	10:25	16:40	BE7215	JUSTFLY	EUR 477.76

Single NDC Offer

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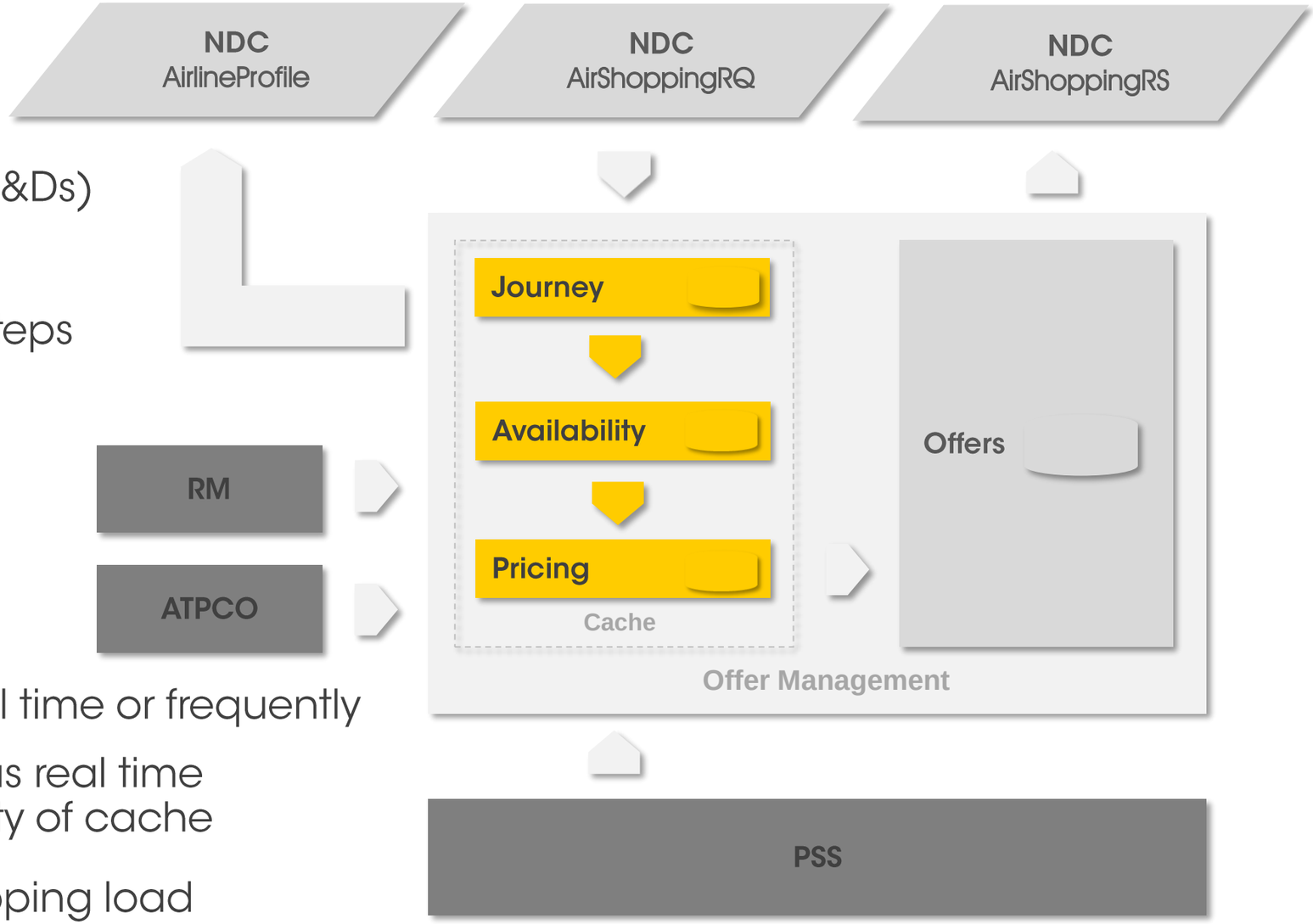
AirBroker NDC Offer Construction

- Cache handles main NDC load
- AirlineProfile delivered to partners
  - Contains available journeys (O&Ds)
  - reduce unnessacary 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



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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

```
−<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>
```

Schema 17.2

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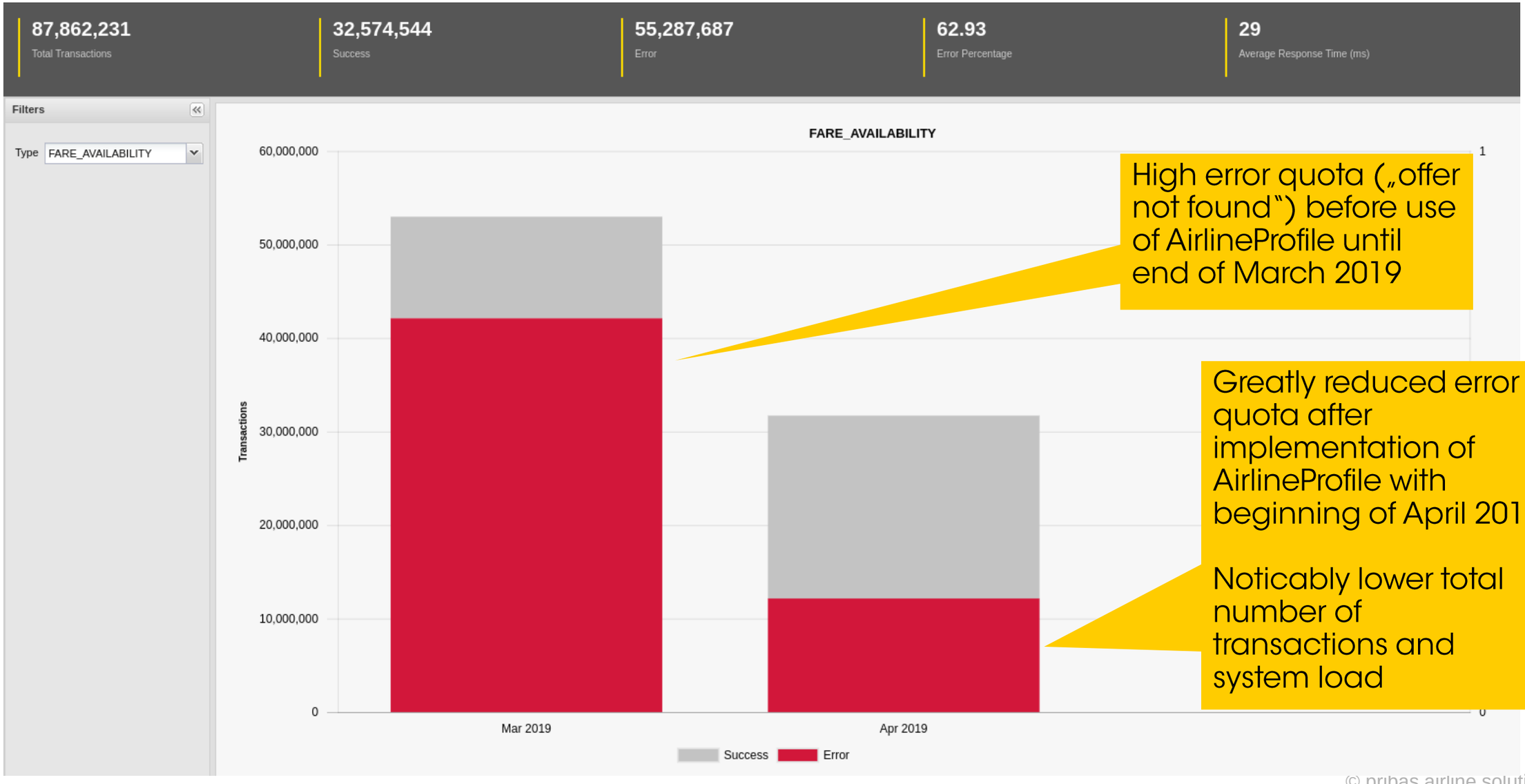
Practical Sample Of Airline Profile Use



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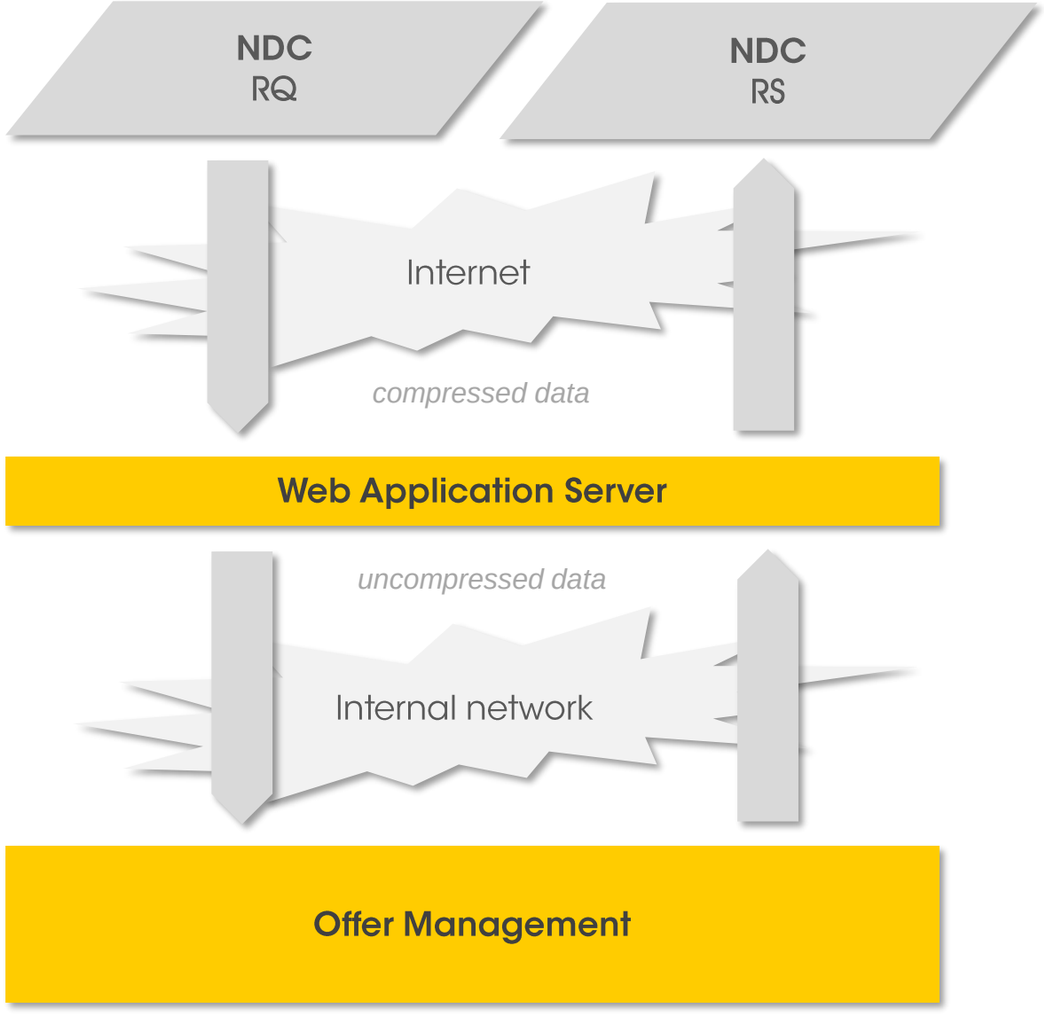
Reduce NDC Network Load With Compression

- 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



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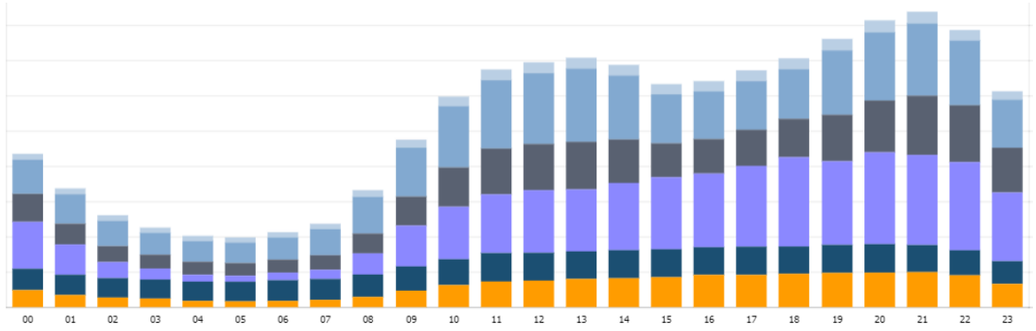
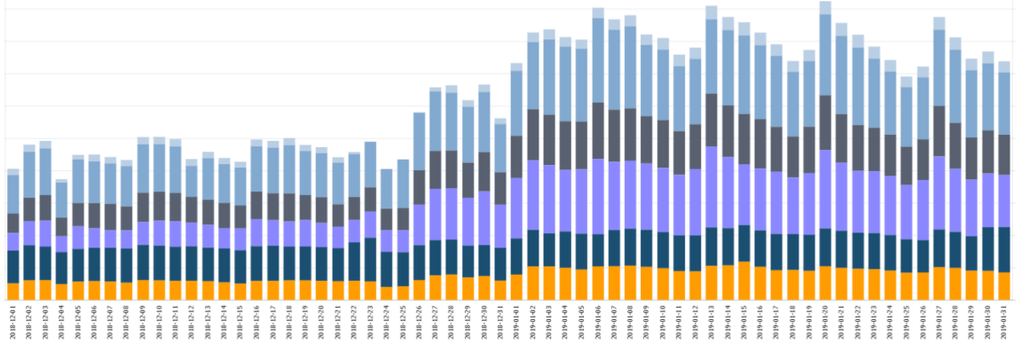
Load Peaks

- 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 continous load difference per weekday
  - Difference between days with lowest volume and peak days is x2.5



transaction load of a typical German hybrid carrier with >50% leisure

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

- Connecting additional distribution partners can increase volume strongly

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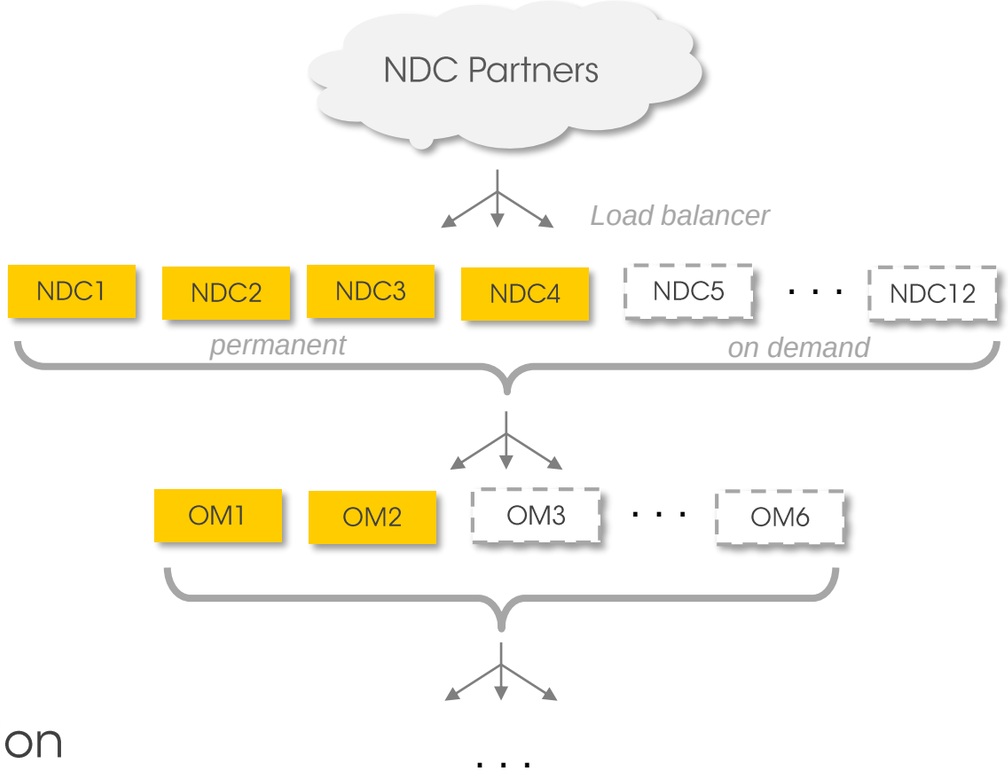
Managing Load Peaks In A Cloud Environment

- 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



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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

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