

# **Air travel hacking**

For fun and (more) miles

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# Who am I?

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- Day job: VoIP geek
  - Built the freenet.de VoIP service
  - Now: Software Architect/Product Manager at VOIPFUTURE (Hamburg, Germany)
  - VoIP quality monitoring
- Spare time
  - Travel addict
  - 500+ flights, 29+ times around the globe, 60+ countries
  - Denied entry to the US only once ;-)
  - <http://openflights.org/user/hs/>

# What am I talking about?

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- Air fare basics
- Global Reservation System attack vectors
- Finding bugs
- The infamous 'fuel dump'

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# **Introduction**

## Terminology

# Terminology

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- Service Class
  - The hard metal
  - Economy, Business, First
- Booking Class
  - Marketing class
  - 'dirt cheap Economy' vs. 'flexible Economy'
  - F,C,Y, A ... Z
  - Booking classes used for 'inventory'
    - F9 A4 C9 J5 Y9 W7 E4 K0
  - First character of fare basis = Booking Class

# Terminology (2)

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- Operating Carrier
  - Lufthansa owns a plane and operates LH401 to NYC
- Marketing Carrier
  - Lufthansa regional owns/operates the plane but Lufthansa sells the seat
- Codeshare
  - LH operates LH401, United sells seat on UA8840
- Plating/Issuing/Validating Carrier
  - United sells a ticket NYC-FRA-HAM with FRA-HAM on Lufthansa (codeshare) flight
  - ticket issued on 'United stock' (016 prefix)

# Information on ticket (1)

United ticket stock (016)

Service Class

seq #

Bitte auf kurzfristigen Wechsel des Ausgangs achten  
Please observe gate changes at short notice

016 3701837661 ECONOMY 003

etix etkt etix etkt

**Bordkarte/Boarding Pass**

Name of passenger  
SCHOLZ/HENDRIKMR  
ETKT 016 3701837661  
HAM  
FRA  
LUFTHANSA SEN

LUFTHANSA  
SCHOLZ/HENDRIKMR  
HAM LH 001 S 01APR  
FRA

11D  
LH 001 /003  
ALSO UA 8915

SEN  
MAX 1 HANDGEPAECK/HANDLUGGAGE

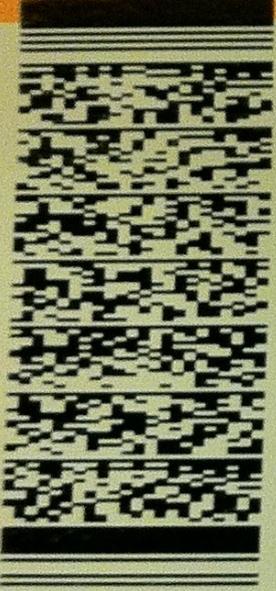
HAM 79863

Carrier	Flight No./Class	Date
LH	001 S	01APR
ALSO	UA 8915	

Gate	Boarding time	Seat
A17	0545	11D

NONSMOKER

Pcs	Ck. Wt.	Unck. Wt.	Pcs.	Ck. Wt.	Unck. Wt.
00					



code share

booking class

# Information on ticket (2)

Do not expose to excessive heat or direct sunlight.

STAPLE  
HERE

INSERT  
A B C

PRINTED IN U.S.A. BY MAGNETIC TICKET & LABEL CORP., DALLAS, TX REV. 5-05 FC981 Run 11-09

**UNITED FIRST**

SCHOLZ/HENDRIKMR  
LH\*G

BOARDING PASS  
LH 222014360

UA 597 APR 5  
FROM CHICAGO/OHARE  
TO MPLS/ST PAUL

DEPARTS AT 8:04 PM

BOARDS AT 7:34 PM

SEAT 2D

CONFIRMATION NBR PF0C84  
016 2104759101 CPN 4  
ISSUED BY U104971 AT 534C08 TPAC

ETKT

SCHOLZ/HENDRIKMR  
LH\*G  
LH 222014360

UA 597 APR 5  
FROM CHICAGO/OHARE  
TO MPLS/ST PAUL

GIVE FEEDBACK - [WWW.UALSURVEY.COM](http://WWW.UALSURVEY.COM)

SEAT 2D

F-CABIN  
016 2104759101 CPN 4

United ticket stock (016)

Passenger Name Record (PNR)

4<sup>th</sup> flight on this PNR (CPN = coupon)

# Information on ticket (3)

Austrian ticket stock (257)



Service Class

location + agent ID

Booking class

# Abnormal Ticket stock

LAN

Bitte auf kurzfristigen Wechsel des Ausgangs achten  
Please observe gate changes at short notice

045 2133584557 ECONOMY 032  
etix etkt etix etkt  
Bordkarte/Boarding Pass

**LUFTHANSA**  
SCHOLZ/HENDRIK  
HAM LH 4510 E 04APR  
PMI

Name of passenger  
**SCHOLZ/HENDRIK**  
ETKT 045 2133584557  
HAM  
PMI  
**LUFTHANSA** SEN

Flight No./Class Date  
4510 E 04APR

auf kurzfristigen Wechsel des Ausgangs achten  
Please observe gate changes at short notice

001 9657587823 ECONOMY 017  
etix etkt etix etkt  
Bordkarte/Boarding Pass

**LUFTHANSA**  
SCHOLZ/HENDRIKMR  
FRA LH 584 W 14AUG  
CAI  
41A  
LH 584 /017  
SEN  
MAX 1 HANDGEPAECK/HANDLUGGAGE  
HAM 77866

Name of passenger  
**SCHOLZ/HENDRIKMR**  
ETKT 001 9657587823  
FRA  
CAI  
**LUFTHANSA** SEN

Carrier Flight No./Class Date  
LH 584 W 14AUG

Gate	Boarding time	Seat
B22	2155	41A NONSMOKER

BOARDING PASS  
NAME  
SCHOLZ/HENDRIKMR  
QTV LH-XXXXXXXXXXXX879/SEN/GOLD  
FROM ZURICH  
TO HAMBURG  
LH 3797 M 17AUG 2020

CARRIER	FLIGHT	CLASS	DATE	TIME
LX	3648	M	17AUG	2020

GATE	BOARDING TIME	SEAT	SMOKE
	1955	5D	NO

Pcs Ck. Wt. Unck. Wt. Pcs. Ck. Wt. Unck. Wt.  
01

American Airlines

ETKT 0019657587823-4 YA CAI  
GOLD  
1 14  
**SEN**

SWISS  
A STAR ALLIANCE MEMBER

# Booking system history

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- 1970s
  - Every airline had its own system
  - Think paper and stickers!
- 1980s
  - Multiple carriers in one system
  - Strong bias towards system owner
- 1990s
  - Global Systems: Amadeus, Worldspan, Galileo
- Now
  - Amadeus, Travelport, Sabre, Travelsky, Patheo, Abacus, Axxess, Topas
  - Systems include hotels and rental cars

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# **Dissecting Fares**

What makes a fare?

# Sample Fare: Lufthansa information



Aktuelle Lufthansa Informationen



Seite 1 – DE 038/11  
10.05.2011

## Günstige Specials von Deutschland zu über 80 Zielen!

Verkaufszeitraum	11. Mai – 14. Juni 2011
Reiseantritt	20. Oktober – 16. Dezember 2011
Fare Basis Code	LH: LNNPDE_ OS: TSS6D

Afrika nach	Preis*	Buchungs-klasse	An-wendung
TUN/CAS	164 €	L	LH
ADD	195 €	L	LH
CAI	234 €	L/T	LHOS
ASM	242 €	L	LH
KRT	255 €	L	LH
ALG	266 €	L	LH
JNB	396 €	L	LH

Asien nach	Preis*	Buchungs-klasse	An-wendung
DEL/BOM	259 €	L/T	LH/OS
CAN	323 €	L	LH
SEL	345 €	L	LH
SHA/BJS	353 €	L	LH
CCU/MAA	359 €	L	LH
BLR	362 €	L	LH
BKK	417 €	L/T	LH/OS
HKG	422 €	L	LH
SGN	450 €	L	LH
KUL	451 €	L	LH
SIN	497 €	L	LH
JKT	512 €	L	LH

Naher Osten nach	Preis*	Buchungs-klasse	An-wendung
DXB	199 €	L/T	LH/OS
KWI	206 €	L	LH
THR	208 €	L/T	LH/OS
AUH	249 €	L	LH
MCT	254 €	L	LH
BAH	303 €	L	LH
DOH	402 €	L	LH
BGW	509 €	T	OS

\*Preise gelten bei Teilnahme am Austrian/Lufthansa/SWISS Vorzugspreisprogramm. Gemäß Vertragsbedingungen ist ggfs. ein Vorzugspreisentgelt zu entrichten. Preise gültig für Hin- und Rückflug zzgl. Flughafensteuern, Passagier- und Sicherheitsgebühren sowie sonstige Gebühren.

In Kooperation mit unseren Partnern LX / OS

Alle Details zu Preisen und Bedingungen finden Sie als veröffentlichte Tarife in den Fare Displays Ihrer Computer Reservierungssysteme. Es gelten die Angaben im Reservierungssystem. Bitte weisen Sie Ihre Kunden darauf hin, dass die genannten Tarife eine Einhaltung der gebuchten Flugreihenfolge erfordern. Bei Nichteinhaltung der gebuchten Flugreihenfolge wird der Tarif auf Basis des geänderten Routings neu kalkuliert.

fare basis

booking class

conditions

### Wichtige Konditionen:

- Gültigkeit/Anwendung: RT/CT/OJ; Afrika/Naher Osten/Asien: LH/ OS  
USA/Kanada/Mexiko: LH/ AC/ BD/ CO/ OS/ UA  
6 Tage/SU US/CA/MX: SU
- Minimum Stay: 3 Monate
- Maximum Stay: -
- Vorausbuchungsfrist: innerhalb von 72 Stunden nach Reservierung  
US/CA/MX: innerhalb von 24 Stunden nach Reservierung
- Ticketing/Bezahlung: US/CA/MX: 5 pro Richtung gestattet  
3 frei in Europa pro Richtung  
2 frei in US/CA/MX pro Richtung
- Kinderermäßigung: nicht gestattet
- Infantermäßigung: gestattet (kein Sitzplatzanspruch)
- Transfers: unbegrenzt, soweit durch Routing nicht begrenzt  
US/CA/MX: 5 pro Richtung gestattet  
3 frei in Europa pro Richtung  
2 frei in US/CA/MX pro Richtung
- Stopover: nicht gestattet
- Buchungsklasse: LH: L OS: T/S
- Umbuchungen: nicht gestattet
- Erstattung: nicht gestattet
- Gruppen: gestattet
- Kombinationen: mit allen Buchungsklassen gestattet
- Miles & More Meilengutschrift: gestattet

# Sample Fare: Expertflyer.com

Fares for FRA to DXB on 11/05/19 with **All** results per page

View Rules  
 View Routing

Search: Departing FRA on 11/05/19 for DXB  
 Flying LH OS  
 Viewing in currency EUR  
 Show Fares for All Travel Dates

Show fares for cabins:

Economy  Business  First   
 Prem. Economy  Prem. First

Fares • 80 items

Fare Basis	Airline	Booking Class	Trip Type	Fare	Cabin	Effective Date	Expiration Date	Min / Max Stay	Adv Purchase Req		
TBUYOS1D	OS	T	Round-Trip	211.00(EUR)	E	11/04/16	11/09/30	SU / --	07		
LNNPDE7	LH	L	Round-Trip	229.00(EUR)	E	11/10/20	11/12/16	V / 12M	07		
LSS6D	OS	L	Round-Trip	229.00(EUR)	E			SU / 3M	07		
LBUYOSD1	OS	L	Round-Trip	259.00(EUR)	E	11/04/16	11/09/30	V / 12M	07		
LBUYOS1D	OS	L	Round-Trip	295.00(EUR)	E	10/12/01 11/01/01 11/04/16	11/12/31 12/02/15 11/09/30	SU / --	07		
WLNCDE7	LH	W	Round-Trip	299.00(EUR)	E	11/04/16	11/09/30	V / 12M	07		
EBUYOSD1	OS	E	Round-Trip	309.00(EUR)	E	10/12/01 11/01/01 11/04/16	11/12/31 12/02/15 11/09/30	V / 12M	07		
KFLYOS1D	OS	K	Round-Trip	349.00(EUR)	E			V / --	04		

# Sample Fare: Routing rules

V FARE BASIS BK FARE TRAVEL-TICKET AP MINMAX RTG  
1 **LNNPDE7** L#R 325.00 E200C T14JN 7/1 #/12M EH01  
D16DE

PASSENGER TYPE-ADT AUTO PRICE-YES  
FROM-FRA TO-DXB CXR-LH TVL-19MAY11 RULE-EPD7 IPREUME/22  
FARE BASIS-LNNPDE7 SPECIAL FARE DIS-E VENDOR-ATP  
FARE TYPE-XAN RT-APEX NONREFUNDABLE  
EUR **229.00** 2211 E20OCT11 D16DEC11 FC-LNNPDE7 FN-60  
SYSTEM DATES - CREATED 10MAY11/1939 EXPIRES INFINITY

PUBLISHED RTG FRA-DXB/LH2211/TAR-EURG EF-11MAY11 DIS-INDEF

/WITHIN THE EASTERN HEMISPHERE/

- FRA-LH-STR/NUE/MUC/HAM/HAJ/FRA/DUS-SN/OS/LH-ZRH/VIE/MUC/  
FRA/DUS/BRU-SN/OS/LH-DXB**
- FRA-SN/OS/LH-ZRH/VIE/MUC/FRA/DUS/BRU-SN/OS/LH-DXB**
- FRA-SN/OS/LH-DXB**

# Sample Fare: fare rules

RULE APPLICATION AND OTHER CONDITIONS NOTE - THE FOLLOWING TEXT IS INFORMATIONAL AND NOT VALIDATED FOR AUTOPRICING. LUFTHANSA PROMOTIONAL FARES BETWEEN GERMANY AND MIDDLE EAST APPLICATION AREA THESE FARES APPLY BETWEEN GERMANY AND MIDDLE EAST. CLASS OF SERVICE THESE FARES APPLY FOR ECONOMY CLASS SERVICE. TYPES OF TRANSPORTATION FARES GOVERNED BY THIS RULE CAN BE USED TO CREATE ROUND-TRIP/SINGLE OPEN-JAW/DOUBLE OPEN-JAW JOURNEYS. RETROACTIVE APPLICATION NOT PERMITTED EXCEPT WHEN UPGRADED FROM A LOWER FARE ALL CONDITIONS OF THE NEW FARE MUST BE MET. CAPACITY LIMITATIONS THE CARRIER SHALL LIMIT THE NUMBER OF PASSENGERS CARRIED ON ANY ONE FLIGHT AT FARES GOVERNED BY THIS RULE AND SUCH FARES WILL NOT NECESSARILY BE AVAILABLE ON ALL FLIGHTS. THE NUMBER OF SEATS, WHICH THE CARRIER SHALL MAKE AVAILABLE ON A GIVEN FLIGHT, WILL BE DETERMINED BY THE CARRIER'S BEST JUDGEMENT. OTHER CONDITIONS MILEAGE UPGRADE FOR L/S/W BOOKING CLASSES NOT PERMITTED. ELIGIBILITY NO ELIGIBILITY REQUIREMENTS APPLY. DAY/TIME NO DAY/TIME TRAVEL RESTRICTIONS APPLY. SEASONALITY PERMITTED 20OCT11 THROUGH 16DEC11. SEASON IS BASED ON DATE OF ORIGIN. FLIGHT APPLICATION THE FARE COMPONENT MUST INCLUDE TRAVEL BETWEEN EUROPE AND MIDDLE EAST ON ONE OR MORE OF THE FOLLOWING ANY LH FLIGHT OPERATED BY LH. ADVANCE RESERVATIONS/TICKETING CONFIRMED RESERVATIONS FOR ALL SECTORS ARE REQUIRED AT LEAST 7 DAYS BEFORE DEPARTURE. TICKETING MUST BE COMPLETED WITHIN 24 HOURS AFTER RESERVATIONS ARE MADE OR AT LEAST 7 DAYS BEFORE DEPARTURE WHICHEVER IS EARLIER. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. WAITLIST NOT PERMITTED AT TIME OF TICKETING.

----- DUE TO AUTOMATED TICKETING DEADLINE CONTROL DIFFERENCE COULD EXIST BETWEEN THE FARE RULE LAST TICKETING DATE AND THE SYSTEM GENERATED TICKETING DEADLINE MESSAGE. THE MORE RESTRICTIVE TICKETING DEADLINE APPLIES. MINIMUM STAY TRAVEL FROM LAST INTERNATIONAL STOPOVER MUST COMMENCE NO EARLIER THAN 6 DAYS AFTER DEPARTURE FROM FARE ORIGIN. OR - TRAVEL FROM LAST INTERNATIONAL STOPOVER MUST COMMENCE NO EARLIER THAN 1201AM ON THE FIRST SUN AFTER DEPARTURE FROM FARE ORIGIN. MAXIMUM STAY TRAVEL FROM LAST STOPOVER MUST COMMENCE NO LATER THAN 12 MONTHS AFTER DEPARTURE FROM FARE ORIGIN. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. IF DESIRED RETURN FLIGHT CANNOT BE BOOKED AS DATE IS OUTSIDE SYSTEM BOOKING RANGE OF 360 DAYS IN ADVANCE AN ALTERNATIVE FLIGHT MUST BE BOOKED FOR TICKET ISSUANCE. ANY LATER REBOOKING TO DESIRED DATE - WITHIN MAXIMUM VALIDITY - IS ONLY POSSIBLE IF PERMITTED BY FARE NOTE AND REQUIRES REBOOKING FEE IF APPLICABLE. STOPOVERS STOPOVERS NOT PERMITTED ON THE FARE COMPONENT. TRANSFERS UNLIMITED TRANSFERS PERMITTED IN EACH DIRECTION. FARE BREAK SURFACE SECTORS NOT PERMITTED AND EMBEDDED SURFACE SECTORS PERMITTED ON THE FARE COMPONENT. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. UNLESS RESTRICTED BY ROUTING ATTACHED TO FARE RECORDS. COMBINATIONS END-ON-END NOT PERMITTED. ADD-ONS PERMITTED. OPEN JAWS FARES MAY BE COMBINED ON A HALF ROUND TRIP BASIS - TO FORM SINGLE OR DOUBLE OPEN JAWS A MAXIMUM OF TWO INTERNATIONAL FARE COMPONENTS PERMITTED. MILEAGE OF THE OPEN SEGMENT MUST BE EQUAL/ LESS THAN MILEAGE OF THE LONGEST FLOWN FARE COMPONENT. PROVIDED - WHEN THE OPEN SEGMENT OCCURS - WITHIN AREA 1/WITHIN AREA 2 OR WITHIN AREA 3 COMBINATIONS ARE WITH ANY FARE FOR CARRIER LX/OS/ SN/BD/LH IN ANY RULE AND TARIFF. ROUND TRIPS/CIRCLE TRIPS FARES MAY BE COMBINED ON A HALF ROUND TRIP BASIS - TO FORM ROUND TRIPS - TO FORM CIRCLE TRIPS A MAXIMUM OF TWO INTERNATIONAL FARE COMPONENTS PERMITTED. PROVIDED - COMBINATIONS ARE WITH ANY FARE FOR CARRIER LX/OS/ SN/BD/LH IN ANY RULE AND TARIFF. BLACKOUT DATES NO BLACKOUT DATES APPLY. SURCHARGES THE PROVISIONS BELOW APPLY ONLY AS FOLLOWS - WHEN TICKETS ARE SOLD IN IRAN. AND - IF INFANT WITHOUT A SEAT PSGR UNDER 2. THERE IS NO FUEL SURCHARGE PER DIRECTION. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. SALE OF THIS FARE IS PERMITTED WORLDWIDE. THIS SURCHARGE IS ONLY APPLICABLE WHEN TICKETS ARE SOLD IN ISLAMIC REPUBLIC OF IRAN. THE PROVISIONS BELOW APPLY ONLY AS FOLLOWS - WHEN TICKETS ARE SOLD IN IRAN. FUEL SURCHARGE OF EUR 110.00 PER DIRECTION WILL BE ADDED TO THE APPLICABLE FARE. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. SALE OF THIS FARE IS PERMITTED WORLDWIDE. **THIS SURCHARGE IS ONLY APPLICABLE WHEN TICKETS ARE SOLD IN ISLAMIC REPUBLIC OF IRAN.** ACCOMPANIED TRAVEL ACCOMPANIED TRAVEL NOT REQUIRED. TRAVEL RESTRICTIONS VALID FOR TRAVEL COMMENCING ON/AFTER 20OCT11 AND ON/ BEFORE 16DEC11. SALES RESTRICTIONS FOOTNOTE RULE TICKETS MUST BE ISSUED ON/BEFORE 14JUN11. GENERAL RULE - APPLY UNLESS OTHERWISE SPECIFIED EXTENSION OF TICKET VALIDITY IS NOT PERMITTED. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. SALES RESTRICTIONS/ SEQUENTIAL USE OF FLIGHT COUPONS OTHER CONDITIONS SEQUENTIAL USE OF FLIGHT COUPONS - THIS FARE IS ONLY VALID IF THE FLIGHTS ARE TAKEN IN THE BOOKED SEQUENCE. OTHERWISE THE FARE WILL BE RECALCULATED BASED ON THE ACTUAL FLIGHT ROUTING. RESPECTIVE REISSUE MUST BE DONE AS DESCRIBED IN GGAIRLHPT5INFO - OUT OF SEQUENCE REISSUE /1A USER/ GC.LH - GP.68 /1G USER/ G/AIR/LH0 - CAT TICKETING /1P USER/ ESERVICE.SABRE.COM - CAT TICKETING /1S USER/ S.LHB/TICKETING /1V USER/PENALTIES CANCELLATIONS ANY TIME TICKET IS NON-REFUNDABLE. WAIVED FOR DEATH OF PASSENGER OR FAMILY MEMBER. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. THE FOLLOWING RULES APPLY PER PRICING UNIT. ----- WAIVERS MUST BE EVIDENCED BY DEATH CERTIFICATE. ----- FULL REFUND PERMITTED BEFORE DEPARTURE IN CASE OF REJECTION OF VISA. EMBASSY STATEMENT REQUIRED. ----- REFUND OF UNUSED FEES AND TAXES PERMITTED. UNLESS APPLICABLE OW/RT FARE PLUS TAXES FOR ACTUAL TRAVEL IS HIGHER THAN WHOLE ORIGINAL TICKET. IN THIS CASE NO TAX OR FEE REFUND WILL BE PERMITTED. YQ OR YR FUEL AND SECURITY SURCHARGE WILL NOT BE REFUNDED. FOR NON REFUNDABLE TICKETS THE YQ/YR SURCHARGE WILL NOT BE REFUNDED. CHANGES ANY TIME CHANGES NOT PERMITTED. WAIVED FOR DEATH OF PASSENGER OR FAMILY MEMBER. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. WAIVERS MUST BE EVIDENCED BY DEATH CERTIFICATE. ----- THE FOLLOWING RULES APPLY PER FARE COMPONENT /DIRECTION. ----- CHANGES NOT PERMITTED FOR REISSUE/REVALIDATION/ REROUTING/UPGRADE/DOWNGRADE MCO ISSUANCE NOT PERMITTED. ----- CHANGES NOT PERMITTED IN CASE OF NO SHOW. PLS REFER TO REFUND SECTION IF APPLICABLE. HIP/MILEAGE EXCEPTIONS THE HIGHER INTERMEDIATE POINT RULE DOES NOT APPLY FOR STOPOVERS. TICKET ENDORSEMENTS THE ORIGINAL AND THE REISSUED TICKET MUST BE ANNOTATED - NONREF/FL/CHG RESTRICTED - AND - CHECK FARE NOTE - IN THE ENDORSEMENT BOX. CHILDREN DISCOUNTS CNN/ACCOMPANIED CHILD PSGR 2-11 - CHARGE 100 PERCENT OF THE FARE. TICKET DESIGNATOR - CH AND DISCOUNT PERCENT. MUST BE ACCOMPANIED ON ALL FLIGHTS IN THE SAME COMPARTMENT BY ADULT PSGR 12 OR OLDER. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. FOR CHILDREN TURNING 12 YEARS ENROUTE - ADULT FARE HAS TO BE USED FOR THE ENTIRE JOURNEY. OR - INS/INFANT WITH A SEAT PSGR UNDER 2 - CHARGE 100 PERCENT OF THE FARE. **16** TICKET DESIGNATOR - CH AND DISCOUNT PERCENT. MUST BE ACCOMPANIED ON ALL FLIGHTS IN THE SAME COMPARTMENT BY ADULT PSGR 12 OR OLDER. OR - INF/INFANT WITHOUT A SEAT PSGR UNDER 2 - CHARGE 10 PERCENT OF THE FARE. TICKET DESIGNATOR - IN AND DISCOUNT PERCENT. MUST BE ACCOMPANIED ON ALL FLIGHTS IN THE SAME COMPARTMENT BY ADULT PSGR 12 OR OLDER. NOTE - TEXT BELOW NOT VALIDATED FOR AUTOPRICING. FOR INFANTS TURNING 2 YEARS ENROUTE - DUE TO SAFETY REGULATIONS - A BOOKED SEAT WILL BE REQUIRED FOR THE REMAINING PORTIONS OF THE JOURNEY WHEN A SEPARATE SEAT IS REQUIRED ON A PORTION OF THE JOURNEY -

# Fare rule: categories

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- Travel restrictions, e.g. Blackout dates
- Minimum/Maximum stay
- Permitted flights/carriers
- Stopovers, Transfers
- Change/Cancellation handling

# Sample Fare: rules explained

- Combinations

ADD-ONS PERMITTED.

END-ON-END

END-ON-END COMBINATIONS PERMITTED WITH DOMESTIC  
FARES. VALIDATE ALL FARE COMPONENTS. SIDE TRIPS  
PERMITTED WITH NO RESTRICTIONS.

OPEN JAWS/ROUND TRIPS/CIRCLE TRIPS

...

- End-on-End:     A  B  C

- Add-on:         A  B  C

# Taxes, fees, surcharges

Fare 1: Carrier CO LJXNNZGB LON to EWR (rules)

Passenger type ADT, round trip fare, booking code L

Covers LHR-DUB (Coach), DUB-EWR (Coach) €82.53

Fare 2: Carrier AC LJXNNZGB NYC to LON (rules)

Passenger type ADT, round trip fare, booking code L

Covers LGA-YYZ (Coach), YYZ-LHR (Coach) €82.53

**CO YQ surcharge (YQ) €58.00**

USDA APHIS Fee (XA) €3.55

US Immigration Fee (XY) €4.97

US Customs Fee (YC) €3.91

Irish Passenger Charge (UP) €2.00

US International Arrival Tax (US) €11.58

**United Kingdom Air Passengers Duty (GB) €68.78**

United Kingdom Passenger Service Charge (UB) €25.89

Irish Inspection/Pre-Clearance Charge (UQ) €7.50

**fuel surcharge**

**random UK fee**

**AC YQ surcharge (YQ) €100.30**

Toronto Airport Improvement Fee (SQ) €2.91

Canadian Harmonized Sales Tax (ON) (RC) €0.38

US International Departure Tax (US) €11.58

US September 11th Security Fee (AY) €1.78

US Passenger Facility Charge (XF) €3.20

Subtotal per passenger €471.33

Number of passengers x1

Total airfare & taxes €471.33

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# **Global Distribution Systems (GDS)**

The booking process



# GDS/CRS attack vectors

**typos, logical mistakes**

fare basis

src-dst price  
src-dst price  
src-dst price

**wrong price**

**wrong routing**

routing rules

**'relaxed' rules**

PNR

fare  
database

inventory

**Point of Sale  
(POS) differences**

GDS functions

booking  
engine

**cost miscalculation  
typical web problems**

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# **Booking Engine Exploits**

Skytours pricing

# Skytours (1)

**E-Ticket**

1 x Adult(s)

**Total Airfare**  
**US\$ 981.25**

**Hamburg; Germany - New York City - All Airports; United States**

Select Flight

Fri, 26.Aug 2011	9:00 AM	HAM → EWR	11:45 AM		7605 <b>Lufthansa</b> <small>LH 7605 CONTINENTAL AIRLINES</small>	<input checked="" type="radio"/>
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**New York City - All Airports; United States - Hamburg; Germany**

Select Flight

Mon, 29.Aug 2011	5:40 PM	EWR → HAM	7:30 AM		0074 <b>Continental Airlines</b>	<input checked="" type="radio"/>
Mon, 29.Aug 2011	5:40 PM	EWR → HAM	7:30 AM		1500 <b>United Airlines Inc</b> <small>UA 1500 CONTINENTAL AIRLINES</small>	<input type="radio"/>

**Book It**

# Skytours (2)

- Data stored on client side
  - Fare basis details
  - Pricing information

```
<input type="hidden" name="far_sel" value="PUB">
<input type="hidden" name="far_bas_cod" value="SKNCDEW">
<input type="hidden" name="alt_num" value="0">
<input type="hidden" name="alt_num_all" value="0|1">
<input type="hidden" name="cached" value="0">
<input type="hidden" name="scenario" value="3">
<input type="hidden" name="ttl_far_ori" value="674.25">
<input type="hidden" name="cur_cod_ori" value="EUR">
<input type="hidden" name="currency" value="USD">
<input type="hidden" name="tp" value="674.25">
<input type="hidden" name="bp" value="355.00">
<input type="hidden" name="xp" value="319.25">
      <input type="hidden" name="atp" value="674.25">
<input type="hidden" name="abp" value="355.00">
<input type="hidden" name="axp" value="319.25">

<input type="hidden" name="courseE0" value="1.418238">
<input type="hidden" name="courseS0" value="1.418238">
<input type="hidden" name="courseO0" value="0.705766">
<input type="hidden" name="courseF0" value="1.000000">
<input type="hidden" name="oneway" value="">
```

# Skytours (3)

Total Airfare: US\$ 15.57

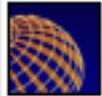
## Flight 1

Friday, August 26, 2011

 <b>Lufthansa</b> 7605	Hamburg; Germany New York - Newark, NJ; United States	9:00 AM 11:45 AM	✈ ✈
--	--	---------------------	--------

## Flight 2

Monday, August 29, 2011

 <b>Continental Airlines</b> 0074	New York - Newark, NJ; United States Hamburg; Germany	5:40 PM 7:30 AM	✈ ✈
---	--	--------------------	--------

---

# **Screen scraping**

Automated brute force searches

# Why Screen scraping?

---

- Avoid human interaction
- Find cheap fares without a specific reason
- Procedure
  - Use known origin + destination airport
  - Use known date
  - Search lots of engines for cheap flights
  - Repeat as required (brute force)
    - change dates/airports

# Screen scraping setup

---

- Use of Perl WWW::Mechanize module
- Targets
  - Huge sites like Expedia, Orbitz, Zuji
    - More likely to honor mistakes
  - Meta search engines
    - Let somebody else do the work
  - Sites with known issues
    - Skytours, LAN, Expedia
  - Different Point of Sales (POS)
    - Currency fluctuations, different availability

# Results (1)

---

- Feature set
  - 10+ sites and different POS
  - Heavy use of AJAX, Web 2.0 technologies
  - WWW::Mechanize rocks!
- Lessons learned
  - At least one website changed every week
  - Only useful if you know what to search for
    - Origin/destination and dates required
  - Re-active rather than pro-active

# Results (2)

---

- Screen scraping might be considered illegal
  - Check your local laws!
- Chasing changes is hard work
  - Often not worth the work
- Next?
  - Get closer to the source (GDS)

---

# **Global Distribution Systems**

Fat finger typos aka 'error fares'

# GDS targets

---

- 'error' and 'mistake' fares
  - Cheap fares
- Routing tricks
  - Improve routing/travel experience
  - Can be used as fuel dump
- 'fuel dump'
  - Save money by not paying for fuel

---

## **Error fares**

Identification & fare hunting

# Error fare metrics

---

- Introduction of a Key Performance Indicator (KPI) for (base) fares
- CPM = cents per mile
  - FRA-JFK: 3855 miles distance
  - Sample fare is \$80
  - Price 8000 cents / 3855 miles = 2.08 cpm
- CPM became de-facto standard
  - Often including taxes
  - Don't confuse pre/post tax/bonus values
  - CPM calculation is complex if routing is

# Decreasing the CPM cost

---

- Improve routing
  - Broken routing rules/missing restrictions
- A \$40 fare increase resulted in \$40 base fare

<http://travel.latimes.com/daily-deal-blog/index.php/british-airways-goof-5578/>

- Missing digits
  - \$100,40 instead of \$1040,00

# Error fare search automation

---

- Again: Perl WWW::Mechanize to the rescue
- Obtain route+base fare combinations from web
  - Ask me for source!
  - Check what KVS tool does
  - Amadeus/Sabre/Galileo access costs money
- Calculate CPM for each fare
  - Use of GCMMap.com (Great Circle Mapper)
- Alarm if worth mentioning
  - Database for comparison, trends
  - Detection of price drops

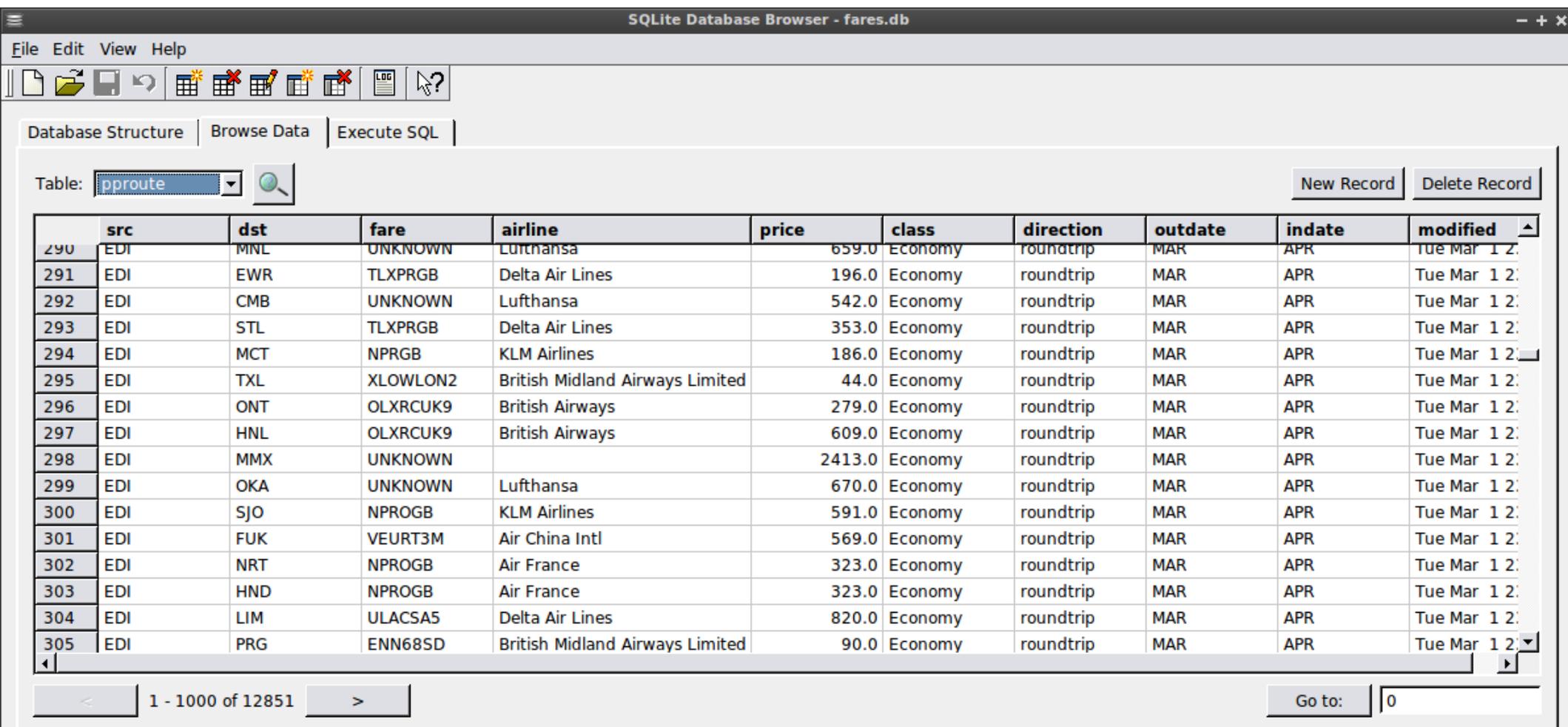
# Faresql.pl implementation

---

- SQLite DB
  - Airport to area mapping
  - Route distances
  - Per route 'best price'
  - Raw listing of all known fares
- Ask me for source
  - Feedback/help well appreciated
- HTML output & source code
  - <http://dedi3.fuckner.net/~hscholz/>
  - <http://dedi3.fuckner.net/~hscholz/faresql-2011-10-12.tar.gz>
- SQLite database
  - Nice queries!

# SQLbrowser

- ~6 mio entries
- Too large for my laptop to display quickly



The screenshot shows the SQLbrowser application window titled "SQLite Database Browser - fares.db". The interface includes a menu bar (File, Edit, View, Help), a toolbar with various icons, and a navigation pane with tabs for "Database Structure", "Browse Data", and "Execute SQL". The "Browse Data" tab is active, showing a table named "pproute". The table has 11 columns: "id", "src", "dst", "fare", "airline", "price", "class", "direction", "outdate", "indate", and "modified". The data is displayed in a grid format, with rows numbered 290 to 305. The "modified" column shows dates like "Tue Mar 12". At the bottom, there is a pagination control showing "1 - 1000 of 12851" and a "Go to:" field with the value "0".

	src	dst	fare	airline	price	class	direction	outdate	indate	modified
290	EDI	MNL	UNKNOWN	Lufthansa	659.0	Economy	roundtrip	MAR	APR	Tue Mar 12
291	EDI	EWR	TLXPRGB	Delta Air Lines	196.0	Economy	roundtrip	MAR	APR	Tue Mar 12
292	EDI	CMB	UNKNOWN	Lufthansa	542.0	Economy	roundtrip	MAR	APR	Tue Mar 12
293	EDI	STL	TLXPRGB	Delta Air Lines	353.0	Economy	roundtrip	MAR	APR	Tue Mar 12
294	EDI	MCT	NPRGB	KLM Airlines	186.0	Economy	roundtrip	MAR	APR	Tue Mar 12
295	EDI	TXL	XLOWLON2	British Midland Airways Limited	44.0	Economy	roundtrip	MAR	APR	Tue Mar 12
296	EDI	ONT	OLXRCUK9	British Airways	279.0	Economy	roundtrip	MAR	APR	Tue Mar 12
297	EDI	HNL	OLXRCUK9	British Airways	609.0	Economy	roundtrip	MAR	APR	Tue Mar 12
298	EDI	MMX	UNKNOWN		2413.0	Economy	roundtrip	MAR	APR	Tue Mar 12
299	EDI	OKA	UNKNOWN	Lufthansa	670.0	Economy	roundtrip	MAR	APR	Tue Mar 12
300	EDI	SJO	NPROGB	KLM Airlines	591.0	Economy	roundtrip	MAR	APR	Tue Mar 12
301	EDI	FUK	VEURT3M	Air China Intl	569.0	Economy	roundtrip	MAR	APR	Tue Mar 12
302	EDI	NRT	NPROGB	Air France	323.0	Economy	roundtrip	MAR	APR	Tue Mar 12
303	EDI	HND	NPROGB	Air France	323.0	Economy	roundtrip	MAR	APR	Tue Mar 12
304	EDI	LIM	ULACSA5	Delta Air Lines	820.0	Economy	roundtrip	MAR	APR	Tue Mar 12
305	EDI	PRG	ENN68SD	British Midland Airways Limited	90.0	Economy	roundtrip	MAR	APR	Tue Mar 12

# Sample find: SFO-AUH \$170++

Fares for SFO to AUH on 11/05/18 with **All** results per page

Search: Departing SFO on 11/05/18 for AUH  
 Returning on 11/06/22  
 Flying AT  
 Purchasing at YYZ  
 Viewing in currency USD

Show fares for cabins:

Economy  Business  First   
 Prem. Economy  Prem. First

View Rules  
 View Routing  
 View Booking Class

Fares • 7 items

Fare Basis	Airline	Booking Class	Trip Type	Fare	Cabin	Effective Date	Expiration Date	Min / Max Stay	Adv Purchase Req			
QKSX3M	AT	Q	Round-Trip	170.00(USD)	E	11/04/16	11/06/12	07 / 3M				
KKSX2M0	AT	K	Round-Trip	1650.00(USD)	E	11/04/15	11/06/12	07 / 2M				
MKPX6M0	AT	M	Round-Trip	1860.00(USD)	E	11/04/15	11/06/12	07 / 6M				
YIFRT2	YY	Y	Round-Trip	8645.00(USD)	E							
JRT	AT	J	Round-Trip	11843.00(USD)	B				90			
CIFRT2	YY	C	Round-Trip	13045.00(USD)	B							
FIFRT2	YY	F	Round-Trip	18505.00(USD)	F							



---

# **The infamous 'fuel dump'**

Fly more – save money

# Trans-Atlantic trip for 224 Euro

Itinerary							
Segment 1	Departure		Arrival		Flight	Cabin	Baggage
Saturday 15 november 2008	<b>07:15</b>	Hamburg (HAM)	<b>08:00</b>	London (LHR)	BA963	Economy-S	2PC
Segment 2							
Saturday 15 november 2008	<b>19:15</b>	London (LHR)	<b>21:45</b>	Boston (BOS)	BA239	Economy-O	2PC
Segment 3							
Sunday 16 november 2008	<b>08:15</b>	Boston (BOS)	<b>19:35</b>	London (LHR)	BA238	Economy-O	2PC
Segment 4							
Monday 17 november 2008	<b>07:50</b>	London (LHR)	<b>10:25</b>	Hamburg (HAM)	BA964	Economy-S	2PC
Segment 5							
Saturday 10 january 2009	<b>06:40</b>	Buenos Aires (AEP)	<b>08:00</b>	Cordoba (COR)	LA4200	Economy-H	2PC
					Operated by LAN ARGENTINA		

Fare			
	Fare	Tax	Total (EUR)
Passenger Adult num 1	147.00	81.74	<b>228.74</b>
Discount 3% LAN.com USA	-4.41	0.00	-4.41
<b>Total</b>	<b>142.59</b>	<b>81.74</b>	<b>€ 224.33</b>

Fare regulations
Does not allow for changes or refunds.
<a href="#">View fare rules and regulations</a>

**See fare in another currency**

Select

**Recalculate**

**Other fares for adult passenger**

(Higher fares involve more flexibility)

**Recalculate**

# Trans-Atlantic trip for 170 Euro

Récapitulatif	
<b>1 Billet / Plusieurs destinations</b>	
HAM Hambourg à	
EWR Newark	
EWR Newark à	
HAM Hambourg	
LAX Los Angeles à	
SFO San Francisco	
<b>Vol 1</b>	sam. 13 févr.
<b>Vol 2</b>	dim. 14 févr.
<b>Vol 3</b>	jeu. 4 mars
1 adulte	117,00 €
Taxes et frais	52,57 €
<b>Total</b>	<b>169,57 €</b>

QUESTIONS	
	<a href="#">L'achat en ligne est-il sécurisé ?</a>
	<a href="#">Besoin d'aide pour cette</a>

**Prix total de ce voyage : 169,57 €**

## 1 Détails des vols

sam. 13 févr. 10

<b>Hambourg</b> (HAM) avec <b>Newark</b> (EWR)	6 136 km	<b>Continental Airlines</b>
Partir 09:00	Arriver 12:00	Vol : <b>75</b>
Terminal 1	Terminal C	Durée : 9h 0min

**Classe Economie**, Boeing 757

Distance totale : 6 136 km

Durée totale : 9h 0min

dim. 14 févr. 10

<b>Newark</b> (EWR) avec <b>Hambourg</b> (HAM)	6 136 km	<b>Continental Airlines</b>
Partir 17:50	Arriver 07:30 <u>+1 jour</u>	Vol : <b>74</b>
Terminal C	Terminal 2	Durée : 7h 40min

**Classe Economie**, Boeing 757

Distance totale : 6 136 km

Durée totale : 7h 40min

jeu. 4 mars 10

<b>Los Angeles</b> (LAX) avec <b>San Francisco</b> (SFO)	544 km	<b>AA</b>
Partir 07:10	Arriver 08:35	Vol : <b>1920</b>
Terminal 4	Terminal 3	Durée : 1h 25min

**Classe Economie**, MDC MD80

Distance totale : 544 km

Durée totale : 1h 25min

# How does it work?

---

- YQ = fuel surcharge
  - Also available as Q surcharge (base ticket price)
- YQ is collected by plating/validating carrier
- YQ may be part of other carriers fare
- Plating carrier fails to collect YQ
  - Interline agreements
  - Plating carrier often keeps YQ
- Fuel dump process:
  - Force ticket to be issued on 'forgetful' carrier

# Perfect forgetful carrier

---

- British Airways (BA) has YQ
- American Airlines (AA) did not have YQ
  - And won't collect it for BA
- Go to AA ticket counter in London
  - Buy BA flight on AA ticket stock
  - Never pay YQ
- Got changed a few years back :-)

# Fuel dump Basics

---

- Methods
  - 3<sup>rd</sup> strike (3x); add-on flight
  - Open Jaw (OJ)
  - Double OJ (DOJ)
- Codenames
  - "I've attempted C1-C2-C1 for the RT and Y-X w/ 13 miler and pineapple poke as my 3x's with no luck"
  - "Cable Beach"
  - "Windy City to Steelers"

# Open Jaw fuel dump example

**138,74**  
EUR per adult

Only 4 ticket(s) left at this price

+ 44,93 EUR taxes & fees = **183,67** EUR total per adult

Select >>>

[Price breakdown](#) [Fare rules](#)

Flight	Airports/times	Stops	Duration/equipment	More information
United 951	Depart: <a href="#">BRU</a> Jan 23 12:10 Arrive: <a href="#">IAD</a> Jan 23 14:46	Non-stop	8h 36m <a href="#">Boeing 777</a>	<a href="#">&gt; Flight info</a> <a href="#">View seats</a> <span style="color: green;">★</span> <a href="#">Autumn in North America sale</a>
<<< connecting to >>>				
United 7135 <small>Operated by UNITED EXPRESS/ MESA AIRLINES</small>	Depart: <a href="#">IAD</a> Jan 23 17:00 Arrive: <a href="#">CLE</a> Jan 23 18:19	Non-stop	1h 19m <a href="#">Bombardier CRJ-200</a>	<a href="#">&gt; Flight info</a> <a href="#">View seats</a> <span style="color: green;">★</span> <a href="#">Autumn in North America sale</a>
United 7881 <small>Operated by UNITED EXPRESS/ TRANS STATES AIRLINES</small>	Depart: <a href="#">CLE</a> Jan 24 6:00 Arrive: <a href="#">ORD</a> Jan 24 6:27	Non-stop	1h 27m <a href="#">Embraer 145</a>	<a href="#">&gt; Flight info</a> <a href="#">View seats</a> <span style="color: green;">★</span> <a href="#">Autumn in North America sale</a>
<<< connecting to >>>				
United 638	Depart: <a href="#">ORD</a> Jan 24 9:00 Arrive: <a href="#">EWR</a> Jan 24 11:56	Non-stop	1h 56m <a href="#">Airbus A320</a>	<a href="#">&gt; Flight info</a> <a href="#">View seats</a> <span style="color: green;">★</span> <a href="#">Autumn in North America sale</a>
United 9256 <small>Operated by Lufthansa</small>	Depart: <a href="#">EWR</a> Jan 24 16:45 Arrive: <a href="#">DUS</a> Jan 25 6:05 <i>Arrives next day</i>	Non-stop	7h 20m <a href="#">Airbus A340-300</a>	<a href="#">&gt; Flight info</a> <a href="#">View seats</a>

---

## **The 3<sup>rd</sup> Strike**

(Optionally) fly more, pay less

# The 3<sup>rd</sup> Strike approach

---

- Addition of flight to ticket to modify ticketing properties
  - Optionally fly 3x ticket
- Find 3x using ITA
  - <http://matrix.itasoftware.com/>
  - Use of 'nearby' feature
  - Use small carriers/locations
  - e.g. LAX-SFO area, intra-Caribbean, intra-Hawaii
- Good base fare needed
  - Promotion fares, subscribe to airline news
  - Low base, high fuel surcharge (YQ)
  - Add-ons have to be allowed

# ITA sample 3<sup>rd</sup> strike search

Round trip | One-way | Multi-city

Departing from: Honolulu International, HI (HNL)  
Enter routing codes

Destination: Kona Keahole, HI (KOA)  
[Remove advanced routing codes](#)

Dates:  Search exact dates  
 See calendar of lowest fares

Outbound date: 7/12/2011 Departure

Adults: 1 [Children, seniors](#)

Cabin: Cheapest available

Stops: No limit

Other:  Allow airport changes  
 Only show flights and prices with

Sales city: Hamburg, Germany

[Change only for trips originating outside of the United States. Learn more](#)

[Simple search options](#)

### Find the best flight deals with Matrix

Find airports near: Honolulu, HI Within: 300 mi

Select airports below << Hide

- Honolulu International, HI (HNL) - 4 miles
- Hoolehua Molokai, HI (MKK) - 50 miles
- Kalaupapa, HI (LUP) - 58 miles
- Lanai City, HI (LNY) - 68 miles
- Kapalua, HI (JHM) - 79 miles
- Kahului, HI (OGG) - 96 miles
- Lihue Kauai Island, HI (LIH) - 105 miles
- Hana, HI (HNM) - 124 miles
- Kona Keahole, HI (KOA) - 159 miles
- Kamuela, HI (MUE) - 167 miles
- Hilo Int'l, HI (ITO) - 212 miles

Select all

Include helipads, bus and rail stations

Google Map data ©2011 Google - [Terms of Use](#)

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this site

# ITA sample results

<input checked="" type="checkbox"/>	Pacific Wings, L.L.C.	Mokulele Flight Service	Island Air	Hawaiian	Mesa
All flights					
Nonstop	From <b>€43</b>	From €46	From €48	From €61	From €78
1 stop	From €47	From €98	From €59	From €89	From €139

One-way: HNL, MKK, LUP, LNY, JHM, OGG, LIH, HNM, KOA, MUE, ITO to KOA, MUE, ITO, HNM, LUP, MKK, HNL, LIH - Tue, Jul 12 ▶ Com

PRICE ▼	AIRLINE ▼	DEPART ▼	ARRIVE ▼	DURATION ▼	FROM/TO ▼	STOPS ▼	AL
€43	Pacific Wings, L.L.C.	6:30am	7:05am	0h 35m	OGG to KOA	--	
€43	Pacific Wings, L.L.C.	7:35am	8:10am	0h 35m	KOA to OGG	--	
€43	Pacific Wings, L.L.C.	12:35pm	1:10pm	0h 35m	KOA to OGG	--	
€43	Pacific Wings, L.L.C.	3:30pm	4:05pm	0h 35m	KOA to OGG	--	
€43	Pacific Wings, L.L.C.	7:35pm	8:10pm	0h 35m	KOA to OGG	--	
€43	Pacific Wings, L.L.C.	9:15pm	9:50pm	0h 35m	OGG to KOA	--	
€43	Pacific Wings, L.L.C.	10:05pm	10:40pm	0h 35m	KOA to OGG	--	
€44	Pacific Wings, L.L.C.	8:00am	8:30am	0h 30m	MKK to HNL	--	

# ITA sample results (POS: BOS)

	Pacific Wings, L.L.C.	Mokulele Flight Service	Mesa	Island Air	Hawaiian
All flights					
Nonstop	From <b>\$59</b>	From \$65	From \$65	From \$67	From \$85
1 stop	From \$66	From \$137	From \$137	From \$84	From \$125

<b>\$59</b>	Pacific Wings, L.L.C.	10:05pm	10:40pm	0h 35m	KOA to OGG	--
<b>\$62</b>	Pacific Wings, L.L.C.	8:00am	8:30am	0h 30m	MKK to HNL	--
<b>\$62</b>	Pacific Wings, L.L.C.	12:05pm	12:35pm	0h 30m	MKK to HNL	--
<b>\$65</b>	 Mesa	8:55am	9:31am	0h 36m	HNL to LNY	--
<b>\$65</b>	Mokulele Flight Service	8:55am	9:31am	0h 36m	HNL to LNY	--

# ITA search processing

---

- Search for
  - Cheap fares (low base, high YQ)
  - Add-Ons allowed
- Base fare sources
  - faresql.pl output
  - <http://dedi3.fuckner.net/~hscholz/>
  - Flyertalk Mileage Run forums

# Fuel dump execution

---

- Find flight you want
  - E.g. via ITA
  - Not all can be combined (Add-Ons)
- Enter on Orbitz, Expedia, ...
- Add 3<sup>rd</sup> strike
- Enjoy savings
- Don't call the airlines!

# Fuel dump example

- faresql hit

2011-Oct-06	10:52	LAX	NRT	Continental Airlines	KKX03CJ1	163.00	CAD	CPM: 2.99
2011-Oct-06	10:52	LAX	NRT	United	KKX03CJ1	163.00	CAD	CPM: 2.99
2011-Oct-06	10:52	LAX	NRT	Delta Air Lines	TRX7KSL0	141.00	CAD	CPM: 2.58
2011-Oct-06	10:52	LAX	NRT	Continental Airlines	KLX73CJ1	141.00	CAD	CPM: 2.58
2011-Oct-06	10:52	LAX	NRT	United	KLX73CJ1	141.00	CAD	CPM: 2.58
2011-Oct-06	10:52	LAX	NRT	Continental Airlines	KLX33AJ8	133.00	CAD	CPM: 2.43
2011-Oct-06	10:52	LAX	NRT	United	KLX33AJ8	133.00	CAD	CPM: 2.43
2011-Oct-06	10:52	LAX	NRT	Delta Air Lines	TRXKSL8	163.00	CAD	CPM: 2.99

- Rules allow End-to-End and Add-ons

## Los Angeles (LAX) to Tokyo (NRT) - Thu, Nov 17



Continental 891  
OPERATED BY UNITED

Dep: 11:37AM Arr: 4:35PM  
Fri, Nov 18

11h 58m Boeing 777

Coach (K)

## Tokyo (HND) to Los Angeles (LAX) - Tue, Nov 22



Continental 9720  
OPERATED BY ANA

Dep: 12:05AM Arr: 4:55PM  
Mon, Nov 21

9h 50m Boeing 777

Coach (K)

Cost per passenger (including taxes & fees)

\$788.20

**Total cost for 1 passenger**

**\$788.20**

# Fuel dump fare breakdown

- Huge \$576 fuel surcharge (YQ)

Provide this information to a travel agent to help them match the fares found.

**Make sure to provide the exact booking and fare codes shown.**

**Fare 1:** Carrier CO KLX73CJ1 LAX to TYO ([rules](#)) \$66.00

Passenger type ADT, round trip fare, booking code K

Covers LAX-NRT (Coach)

**Fare 2:** Carrier CO KLX33AJ8 TYO to LAX ([rules](#)) \$62.50

Passenger type ADT, round trip fare, booking code K

Covers HND-LAX (Coach)

CO YQ surcharge (YQ) \$576.00

US International Departure Tax (US) \$16.30

US September 11th Security Fee (AY) \$2.50

US Passenger Facility Charge (XF) \$4.50

USDA APHIS Fee (XA) \$5.00

US Immigration Fee (XY) \$7.00

US Customs Fee (YC) \$5.50

Japan International Passenger Facility Charge (SW) \$26.10

US International Arrival Tax (US) \$16.30

---

Subtotal per passenger \$788.20

Number of passengers x1

---

**TOTAL AIRFARE & TAXES \$788.20**

**fuel surcharge**



# Cost calculation

- How much can we theoretically save?
- 3<sup>rd</sup> strike flight costs (base + taxes)

item	regular	fuel dump
base fare	\$128.50	\$128.50
fuel surcharge	\$576	\$0
other fees, taxes	\$83.20	\$83.20
cost of 3 <sup>rd</sup> strike	\$0	\$79 (+fees, taxes)
<b>total</b>	<b>\$788.20</b>	<b>~\$300 (-\$488 -62%)</b>

# First attempt: partial fuel dump

- \$60 3<sup>rd</sup> strike ticket + fees, taxes

[Select](#) **\$181 + \$302 taxes & fees = \$483 USD per person** PRICE ASSURANCE <sup>1</sup> ← pricing info

Flight 1	<b>Thu, Nov 17</b> Depart: 11:37am Arrive: 4:35pm <b>Non-stop</b> 🕒 This is an overnight flight.	<b>United Airlines 891</b> Los Angeles, CA (LAX) Tokyo, Japan (NRT) Economy   11hr 58min   Boeing 777   <a href="#">View seats</a>	<a href="#">Choose flight 1</a>
Flight 2	<b>Tue, Nov 22</b> Depart: 12:05am Arrive: 4:55pm <b>Non-stop</b> 🕒 This flight arrives on the previous day. 🕒 This flight departs from a different airport.	<b>United Airlines 9720</b> operated by All Nippon Airways – NH 1006 Tokyo, Japan (HND) Los Angeles, CA (LAX) Economy   9hr 50min   Boeing 777   <a href="#">View seats</a>	<a href="#">Choose flight 2</a>
Flight 3	<b>Fri, Nov 25</b> Depart: 3:10am Arrive: 3:45am <b>Non-stop</b> 🕒 This flight departs from a different airport.	<b>Continental Airlines 5062</b> operated by CAPE AIR DBA CONTINENTAL CONNECTION Rota, Northern Mariana Islands (ROP) Saipan, Northern Mariana Islands (SPN) Economy   35min   ATR42 Turboprop   <a href="#">View seats</a>	<a href="#">Choose flight 3</a>

← 3<sup>rd</sup> strike

# Better 3<sup>rd</sup> strike option

[Select](#) **\$216 + \$185 taxes & fees = \$401 USD per person** **PRICE ASSURANCE** <sup>i</sup>

	<b>Flight 1</b> <b>Thu, Nov 17</b>	<b>Continental Airlines 891</b> operated by United Airlines – UA 0891	<a href="#">Choose flight 1</a>
	Depart: <b>11:37am</b> Arrive: <b>4:35pm</b>	Los Angeles, CA ( <b>LAX</b> ) Tokyo, Japan ( <b>NRT</b> )	
	<b>Non-stop</b>	Economy   11hr 58min   Boeing 777   <a href="#">View seats</a>	
	🕒 This is an overnight flight.		
	<b>Flight 2</b> <b>Tue, Nov 22</b>	<b>Continental Airlines 9720</b> operated by All Nippon Airways – NH 1006	<a href="#">Choose flight 2</a>
	Depart: <b>12:05am</b> Arrive: <b>4:55pm</b>	Tokyo, Japan ( <b>HND</b> ) Los Angeles, CA ( <b>LAX</b> )	
	<b>Non-stop</b>	Economy   9hr 50min   Boeing 777   <a href="#">View seats</a>	
	🕒 This flight arrives on the previous day.		
	🕒 This flight departs from a different airport.		
	<b>Flight 3</b> <b>Fri, Nov 25</b>	<b>[REDACTED]</b>	<a href="#">Choose flight 3</a>
		<b>[REDACTED]</b>	
	<b>Non-stop</b>	Economy   30min   ATR42 Turboprop	
	🕒 This flight departs from a different airport.		

# Improve routing

/VIA THE PACIFIC/

1. LAX - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - **HNL** - CO/UA - **GUM** - CO/UA - FUK/HIJ/KIJ/NGO/OKA/OKJ/OSA/SDJ/SPK/TOY/TYO - NH/UA - TYO
2. LAX - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - GUM - CO/UA - TYO
3. LAX - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - OSA/TYO - NH/UA - TYO
4. LAX - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - TYO
5. LAX - CO/UA - LAX/SEA/SFO - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - GUM - CO/UA - FUK/HIJ/KIJ/NGO/OKA/OKJ/OSA/SDJ/SPK/TOY/TYO - NH/UA - TYO
6. LAX - CO/UA - LAX/SEA/SFO - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - GUM - CO/UA - TYO
7. LAX - CO/UA - LAX/SEA/SFO - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - OSA/TYO - NH/UA - TYO
8. LAX - CO/UA - LAX/SEA/SFO - CO/UA - HNL - CO/HA/UA/WP - ITO/JHM/KOA/LIH/LNY/MKK/OGG - CO/HA/UA/WP - HNL - CO/UA - TYO

# Improved routing

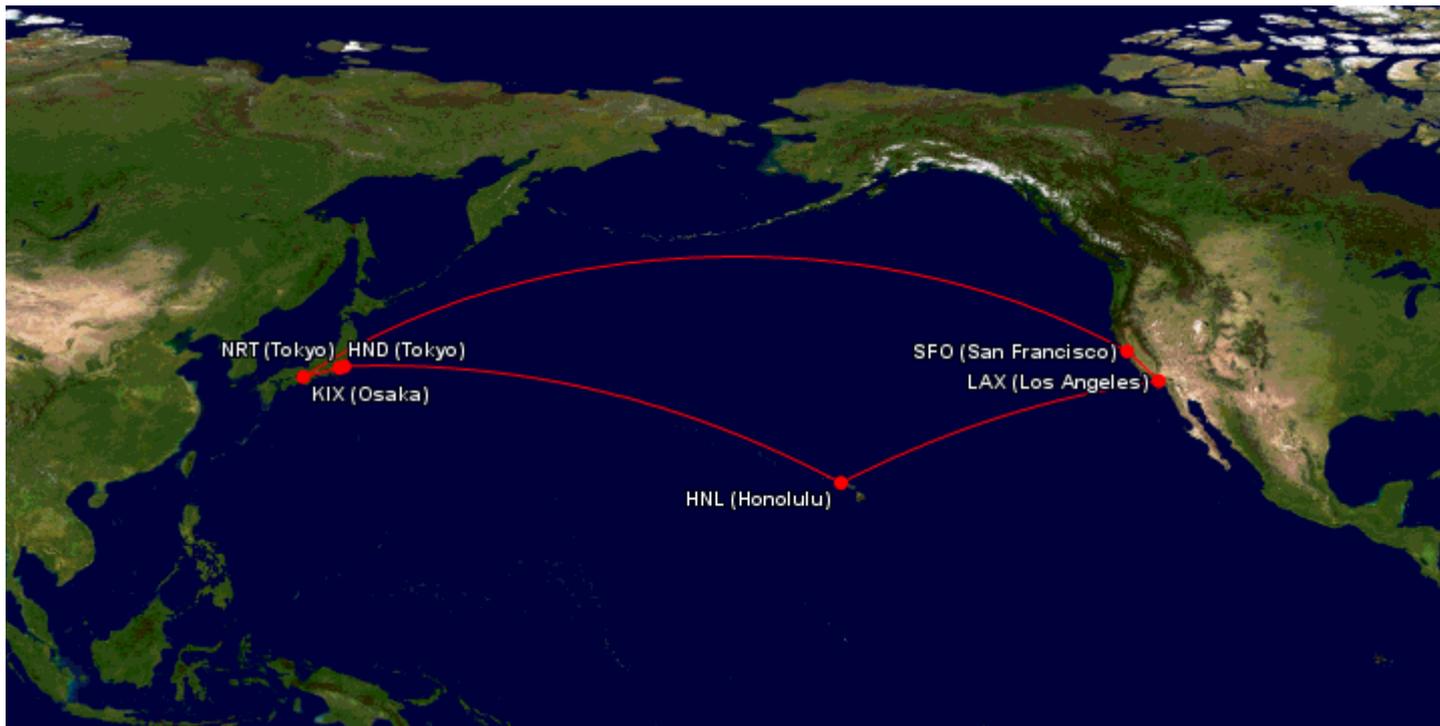
- Note: stopovers may impose additional charges
- Use ITA to maximize routes
- Geek bonus points:  
Try to get on NH 787!

[Select](#) \$220 + \$216 taxes & fees = \$436 USD per person **PRICE ASSURANCE** <sup>i</sup>

Flight 1	<b>Thu, Nov 3</b>	<b>United Airlines 419</b>	<a href="#">Choose flight 1</a>
	Depart: 8:22am Arrive: 9:48am	Los Angeles, CA (LAX) San Francisco, CA (SFO)	
	<b>1 stop</b>	Economy   1hr 26min   Boeing 752   <a href="#">View seats</a>	
	 <b>Change Airline.</b> Time between flights: 1hr 27min		
		<b>Continental Airlines 885</b> operated by United Airlines – UA 0885	
	Depart: 11:15am Arrive: 3:25pm	San Francisco, CA (SFO) Osaka, Japan (KIX)	
		Economy   12hr 10min   Boeing 777   <a href="#">View seats</a>	
		Total duration: 15hr 3min	
	 This is an overnight flight.		
Flight 2	<b>Fri, Nov 4</b>	<b>All Nippon Airways 150</b>	<a href="#">Choose flight 2</a>
	Depart: 9:35pm Arrive: 10:45pm	Osaka, Japan (KIX) Tokyo, Japan (HND)	
	<b>Non-stop</b>	Economy   1hr 10min   Boeing 767	
Flight 3	<b>Mon, Nov 7</b>	<b>Continental Airlines 880</b> operated by United Airlines – UA 0880	<a href="#">Choose flight 3</a>
	Depart: 7:25pm Arrive: 7:23am	Tokyo, Japan (NRT) Honolulu/Oahu, HI (HNL)	
	<b>Non-stop</b>	Economy   6hr 58min   Boeing 777   <a href="#">View seats</a>	
	 This flight departs from a different airport.		
Flight 4	<b>Tue, Nov 8</b>	<b>United Airlines 460</b>	<a href="#">Choose flight 4</a>
	Depart: 7:00am Arrive: 2:27pm	Honolulu/Oahu, HI (HNL) Los Angeles, CA (LAX)	
	<b>Non-stop</b>	Economy   5hr 27min   Boeing 767   <a href="#">View seats</a>	
Flight 5			<a href="#">Choose flight 5</a>
			

# Improved routing result

- Map created via GCmap.com
- 12394 miles traveled for \$436
- San Francisco, Osaka and Honolulu added



# Fuel dump downsides

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- Airlines may figure out what you are doing
- ADM: automated debit message
  - Travel agency has to pay difference
- You have to pay YQ (never seen)
- Cancellation of ticket
  - Esp. if you don't fly 3<sup>rd</sup> strike segment
  - Just add it at the end, not beginning
- Best savings if YQ is high

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**Bag 'o tricks**  
Assorted goodies

# Fare Rule Mistake

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- Rule for Trans-Atlantic fare (Area 2 to Area 1)

```
if [ purchased in Area 1 ] ; then
```

```
    fuel surcharge = $150
```

```
else if [ purchased in Area 2 ] ; then
```

```
    fuel surcharge = 100 Euro
```

```
fi
```

- Solution: Issue ticket outside Area 1 or 2, e.g. Japan!
  - Happened to KLM

# More routing improvements

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- Fare types
  - MPM = Maximum Permitted Miles
  - Route based = fixed list of possible routes
- Both have to comply with fare rules
- Potential results:
  - More stops, more miles
  - E.g. SFO-HNL-LAX instead of SFO-LAX
- Not covered in this talk due to time
  - Ask me!

# Not Covered

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- Point of Sale tricks
  - Better inventory in foreign countries
- Fare Wars
  - Airlines compete for markets and make mistakes
- Routing Optimization
  - Avoid United Kingdom to save surcharges
- Currency Fluctuations
  - Book in Australia/New Zealand (countries change!)

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# **Conclusions**

What next?

# Reasonable Disclosure

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- Deals end up on Fatwallet, Slickdeals, ...
  - Are not honored
  - Die quickly
- Do not abuse these findings to make money!
- Do not call the airlines!
- Give back to the community!

# Cruise for a dollar?

InterlineTravel.com • 800-766-2911					
Sunday, October 18, 2009 • Mediterranean-West • 7 Days • Norwegian Cruise Line • Norwegian Gem • 2 Adults					
INSIDE CABINS		Cabin Window	Cabin Photo	Cabin Price Details	1st / 2nd Per Person Rate
<b>Inside Stateroom</b> Category <b>KK</b> - Deck: <a href="#">5</a> INSIDE Convertible lower beds, pullman bed, pullout bed.		138 sq ft		Per Passenger (2) \$2 Cruise TOTAL \$4	Your Rate <b>\$2*</b> <b>SELECT</b> Interline Special
		No window			
SUITE CABINS		Cabin Window	Cabin Photo	Cabin Price Details	1st / 2nd Per Person Rate
<b>Penthouse</b> Category <b>AE</b> - Deck: <a href="#">9</a> , <a href="#">8</a> PENTHOUSE Queen size bed.		286 sq ft		Per Passenger (2) \$1,199 Cruise TOTAL \$2,398	Your Rate <b>\$1,199*</b> <b>SELECT</b>
		Floor to ceiling			

# Hotel for cheap?

- Holiday Inn on Bali

Rooms: 1  
US\$50.00

**Book now**

The email confirmation is immediate!!

Room type	Conditions	Max	Rate for 5 nights	Nr. rooms
 <p>▶ <b>Ocean Double or Twin Room</b> <span>Just booked!</span> Prices are per room for 5 nights. <b>Included</b> in room price: 11 % TAX, 10 % service charge.</p>	• Non refundable 		<b>US\$ 50</b>	<input type="text" value="0"/>
	• <b>FREE cancellation</b> 		<del>US\$ 1028.50</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="0"/>
 <p>▶ <b>Ajana Suite</b> Prices are per room for 5 nights. <b>Included</b> in room price: 11 % TAX, 10 % service charge, Breakfast.</p>	• Non refundable 		<del>US\$ 1164.50</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="1 (US\$ 50)"/>
	• Breakfast included 			<b>Only 2 rooms left</b>
 <p>▶ <b>Superior Double or Twin Room</b> Prices are per room for 5 nights. <b>Included</b> in room price: 11 % TAX, 10 % service charge.</p>	• Non refundable 		<del>US\$ 750</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="0"/>
	• <b>FREE cancellation</b> 		<del>US\$ 968</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="0"/>
 <p>▶ <b>Special Offer - Ocean Double or Twin Room</b> Prices are per room for 5 nights. <b>Included</b> in room price: 11 % TAX, 10 % service charge, Breakfast.</p>	• Non refundable 		<del>US\$ 1101.50</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="0"/>
	• Breakfast included 			
 <p>▶ <b>Special Offer - Superior Double or Twin Room</b> Prices are per room for 5 nights. <b>Included</b> in room price: 11 % TAX, 10 % service charge, Breakfast.</p>	• Non refundable 		<del>US\$ 859.50</del> <b>US\$ 50</b> <b>Smart price</b>	<input type="text" value="0"/>
	• Breakfast included 			

Rooms: 1  
US\$50.00

**Book now**

 Most recent booking for this hotel was 5 seconds ago from Poland!

 There are 223 people looking at this hotel.

You will pay the hotel in local currency at the exchange rate on the day of payment. Exchange rates a

HOTEL FACILITIES

# References

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- <http://matrix.itasoftware.com/>
- <http://www.expertflyer.com/>
  - Look out for up to 20% rebate vouchers
- <http://www.flyertalk.com/>
  - 'Mileage run deals' sub-forum
- <http://www.milepoint.com/>
  - 'Trick it' thread
- <http://www.farecompare.com/>

# Summary

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- Air travel hacking is lots of fun
- Next iteration hackers vs. GDS
  - Amadeus will introduce real-time updates
- Allows you to go to places you never knew existed
- Goal: get even closer to GDS

**Q&A**

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