

# Einführung in Programmierung mit ABAP:

## Teil 5: Datenbankzugriff

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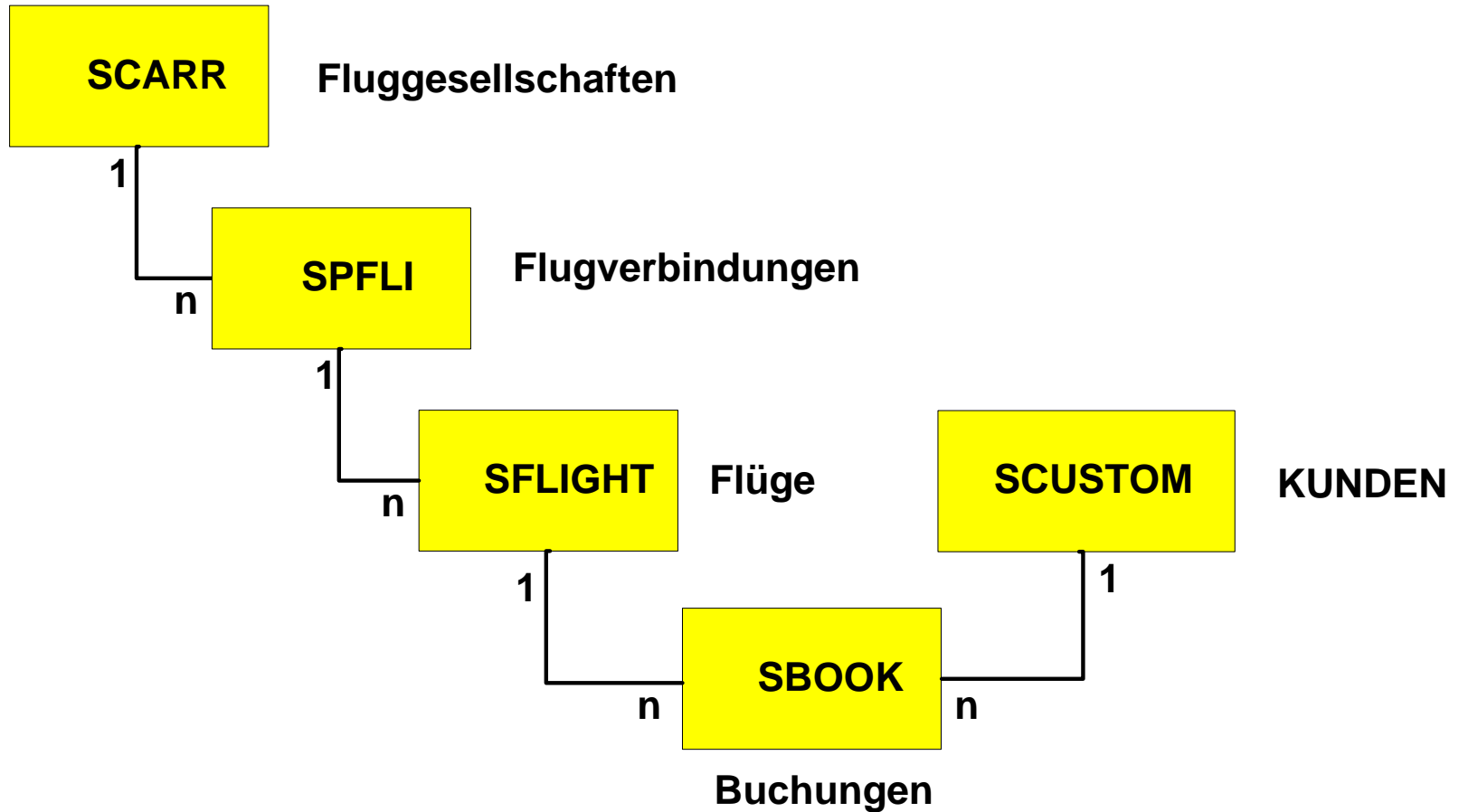
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# Flug-Datenmodell



# Open SQL

Schlüsselwort	Funktion
<b>SELECT</b>	<i>Daten von DB-Tabellen lesen</i>
<b>INSERT</b>	<i>Zeilen in DB-Tabellen einfügen</i>
<b>UPDATE</b>	<i>Zeileninhalte in DB-Tabellen ändern</i>
<b>MODIFY</b>	<i>Zeilen in DB-Tabellen einfügen oder ändern</i>
<b>DELETE</b>	<i>Zeilen aus DB-Tabellen löschen</i>

- Rückgabewerte
  - SY-SUBRC, SY-DBCNT
- Mandantenbehandlung

# DB-Tabelle lesen

```
SELECT [SINGLE] < was >  
      FROM    < woher >  
      INTO    < wohin >  
      WHERE   < Bedingung > .
```

[< ABAP-Anweisungen > .] ...

**[ENDSELECT .]**

- Ergänzende Klauseln

- **GROUP BY** ....
- **HAVING** ....
- **ORDER BY** ....

# Beispiel 1: Sätze in einer Schleife lesen

```
DATA: wa_spfli TYPE spfli .
```

```
SELECT      *  
      FROM    spfli  
      INTO    wa_spfli .
```

```
      < Datensatz verarbeiten > .
```

```
      WRITE: / wa_spfli-carrid, .... .
```

```
ENDSELECT .
```

## Beispiel 2: Sätze in einer Schleife lesen

```
DATA: wa_spfli TYPE spfli,  
        p_carrid TYPE spfli-carrid,  
        p_connid TYPE spfli-connid .
```

```
SELECT cityfrom cityto  
        FROM      spfli  
        INTO CORRESPONDING FIELDS OF wa_spfli  
        WHERE   carrid = p_carrid AND  
                connid = p_connid .
```

```
    < Datensatz verarbeiten > .
```

```
ENDSELECT .
```

## Beispiel 3: einzelne Sätze lesen

**DATA:** *wa\_cityfrom* **TYPE** spfli-cityfrom,  
*wa\_cityto* **TYPE** spfli-cityto,  
*p\_carrid* **TYPE** spfli-carrid,  
*p\_connid* **TYPE** spfli-connid .

```
SELECT SINGLE cityfrom cityto  
FROM          spfli  
INTO          (wa_cityfrom, wa_cityto)  
WHERE         carrid = p_carrid AND  
               connid = p_connid .
```

**< Datensatz verarbeiten > .**

## Beispiel 4: Sätze in interne Tabelle einlesen

```
DATA: spfli_tab TYPE  
                STANDARD TABLE OF spfli,  
                p_carrid TYPE spfli-carrid .
```

```
SELECT *  
    FROM    spfli  
    INTO TABLE spfli_tab  
    WHERE    carrid = p_carrid .
```

**< Datensatz verarbeiten > .**



# WHERE-Klausel

- \* Einfache logische Ausdrücke mit `=`, `<`, `>`, `<>`,
- \* `<=`, `>=`, `NOT`, `AND`, `OR`, `IS NULL`

```
... WHERE carrid = 'UA'
```

- \* Intervallprüfung mit `BETWEEN`

```
... WHERE seatmax BETWEEN 200 AND 300
```

- \* Musterprüfung (zeichenartige Spalten) mit `LIKE`
- \* (`%` für beliebige, `_` genau ein Zeichen)

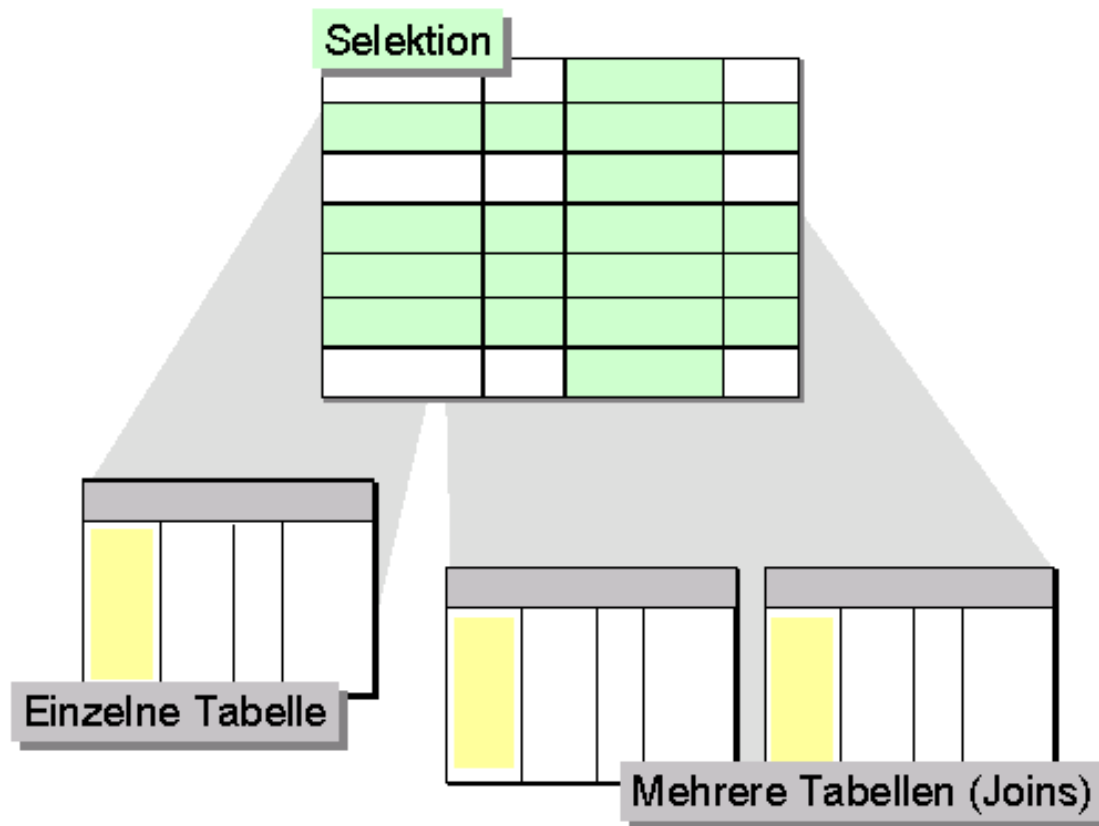
```
... WHERE cityto LIKE '%town'
```

- \* Wertelistenüberprüfung mit `IN`

```
... WHERE cityto IN ('Berlin', 'LONDON')
```

# DB-Tabellen angeben: FROM-Klausel

**SELECT** . . . . **FROM** *tab* [**AS** *alias*] . . . .



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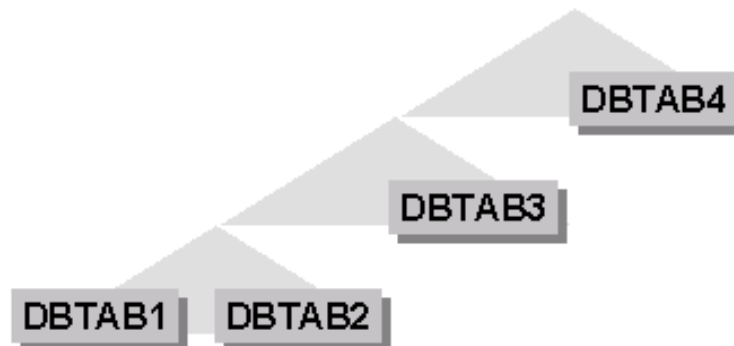
# Verknüpfung mehrerer DB-Tabellen

**SELECT** . . . .

```
FROM tab_A { [INNER] | LEFT [OUTER] } JOIN tab_B  
  [AS alias ] ON feld_A1 = feld_B1  
                  [feld_A2 = feld_B2] . . .
```

. . . .

```
SELECT ...  
...  
FROM ( ( ( DBTAB1 INNER JOIN DBTAB2 ON ... )  
          INNER JOIN DBTAB3 ON ... )  
        INNER JOIN DBTAB4 ON ... )  
... 
```



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# Verknüpfung mehrerer DB-Tabellen


## Fluggesellschaften

AA	American Airlines
AB	Air Berlin
AC	Air Canada
AF	Air France
AZ	Alitalia
BA	British Airways
CO	Continental Airlines
DL	Delta Airlines
FJ	Air Pacific
JL	Japan Airlines
LH	Lufthansa
NG	Lauda Air
NW	Northwest Airlines
QF	Qantas Airways
SA	South African Air.
SQ	Singapore Airlines
SR	Swissair
UA	United Airlines

## Flugverbindungen

{	AA	0017	NEW YORK
	AA	0064	SAN FRANCISCO
	AZ	0555	ROME
	AZ	0788	ROME
	AZ	0790	ROME
	AZ	0789	TOKYO
	DL	1699	NEW YORK
	DL	1984	SAN FRANCISCO
	LH	2407	BERLIN
{	LH	2402	FRANKFURT
	LH	0400	FRANKFURT
	LH	0402	FRANKFURT
	QF	0006	FRANKFURT
{	QF	0005	SINGAPORE
	SQ	0002	SINGAPORE
	SQ	0158	SINGAPORE
	SQ	0866	SINGAPORE
	SQ	0988	SINGAPORE
{	UA	0941	FRANKFURT
	UA	3504	SAN FRANCISCO

# Join über zwei Tabellen I



CARRID	CARRNAME	CURRCODE	CARRID	CONNID	COUNTRYFR	CITYFROM	AIRPFROM	COUNTRYTO	CITYTO
AZ	Alitalia	EUR	DL	0106	US	NEW YORK	JFK	DE	FRANKFURT
BA	British Airways	GBP	DL	1699	US	NEW YORK	JFK	US	SAN FRANCISCO
CO	Continental Airlines	USD	DL	1984	US	SAN FRANCISCO	SFO	US	NEW YORK
DL	Delta Airlines	USD	JL	0407	JP	TOKYO	NRT	DE	FRANKFURT
FJ	Air Pacific	USD	JL	0408	DE	FRANKFURT	FRA	JP	TOKYO
JL	Japan Airlines	JPY	LH	0400	DE	FRANKFURT	FRA	US	NEW YORK
LH	Lufthansa	EUR	LH	0401	US	NEW YORK	JFK	DE	FRANKFURT
NG	Lauda Air	EUR	LH	0402	DE	FRANKFURT	FRA	US	NEW YORK
NW	Northwest Airlines	USD	LH	2402	DE	FRANKFURT	FRA	DE	BERLIN
QF	Qantas Airways	AUD	LH	2407	DE	BERLIN	TXL	DE	FRANKFURT
			QF	0005	SG	SINGAPORE	SIN	DE	FRANKFURT
			QF	0006	DE	FRANKFURT	FRA	SG	SINGAPORE

```
DATA: BEGIN OF wa_satz,
      carrid      TYPE scarr-carrid,
      carrname    TYPE scarr-carrname,
      connid      TYPE spfli-connid,
END OF wa_satz .
```

```
SELECT scarr~carrid scarr~carrname spfli~connid
      INTO CORRESPONDING FIELDS OF wa_satz
      FROM scarr INNER JOIN spfli
           ON      scarr~carrid = spfli~carrid
           WHERE spfli~cityfrom = 'FRANKFURT'.
```

```
WRITE: / wa_satz-carrid, wa_satz-carrname, wa_satz-connid,
ENDSELECT .
```

## Lesen auf zwei Tabelle (Join)

```
DATA:  wa_scarr TYPE scarr ,  
        wa_spfli TYPE spfli .
```

```
SELECT * FROM scarr INTO wa_scarr .  
  < Datensatz verarbeiten > .
```

```
SELECT * FROM spfli INTO wa_spfli  
  WHERE ?????? .
```

```
  < Datensatz verarbeiten > .
```

```
ENDSELECT .
```

```
ENDSELECT .
```

# Join über zwei Tabellen II

CARRID	CARRNAME	CURRCODE
AZ	Alitalia	EUR
BA	British Airways	GBP
CO	Continental Airlines	USD
DL	Delta Airlines	USD
FJ	Air Pacific	USD
JL	Japan Airlines	JPY
LH	Lufthansa	EUR
NG	Lauda Air	EUR
NW	Northwest Airlines	USD
QF	Qantas Airways	AUD

CARRID	CONNID	COUNTRYFR	CITYFROM	AIRPFROM	COUNTRYTO	CITYTO
DL	0106	US	NEW YORK	JFK	DE	FRANKFURT
DL	1699	US	NEW YORK	JFK	US	SAN FRANCISCO
DL	1984	US	SAN FRANCISCO	SFO	US	NEW YORK
JL	0407	JP	TOKYO	NRT	DE	FRANKFURT
JL	0408	DE	FRANKFURT	FRA	JP	TOKYO
LH	0400	DE	FRANKFURT	FRA	US	NEW YORK
LH	0401	US	NEW YORK	JFK	DE	FRANKFURT
LH	0402	DE	FRANKFURT	FRA	US	NEW YORK
LH	2402	DE	FRANKFURT	FRA	DE	BERLIN
LH	2407	DE	BERLIN	TXL	DE	FRANKFURT
QF	0005	SG	SINGAPORE	SIN	DE	FRANKFURT
QF	0006	DE	FRANKFURT	FRA	SG	SINGAPORE

DATA: wa\_scarr      TYPE scarr,  
       wa\_spfli      TYPE spfli .

```
SELECT * FROM SCARR INTO wa_scarr .
SELECT * FROM SPFLI INTO wa_spfli .
WHERE   carrid = wa_scarr-carrid AND
        spfli~cityfrom = 'FRANKFURT' .
```

WRITE: / wa\_scarr-carrid, wa\_scarr-carrname, wa\_spfli-connid.

```
ENDSELECT .
ENDSELECT .
```

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# Beispiel zu LEFT OUTER JOIN

```
DATA: BEGIN OF wa_satz,  
    carrid      TYPE scarr-carrid,  
    carrname    TYPE scarr-carrname,  
    connid      TYPE spfli-connid,  
END OF wa_satz .  
  
SELECT s~carrid s~carrname p~connid  
    INTO CORRESPONDING FIELDS OF wa_satz  
FROM scarr AS s  
    LEFT OUTER JOIN spfli AS p  
    ON s~carrid = p~carrid AND  
    p~cityfrom = 'FRANKFURT'.  
  
WRITE: / wa_satz-carrid,  
        wa_satz-carrname,  
        wa_satz-connid.  
  
ENDSELECT .
```

## Test LEFT OUTER JOIN

AA	American Airlines	0000
AB	Air Berlin	0000
AC	Air Canada	0000
AF	Air France	0000
AZ	Alitalia	0000
BA	British Airways	0000
CO	Continental Airlines	0000
DL	Delta Airlines	0000
FJ	Air Pacific	0000
JL	Japan Airlines	0000
LH	Lufthansa	0400
LH	Lufthansa	0402
LH	Lufthansa	2402
NG	Lauda Air	0000
NW	Northwest Airlines	0000
QF	Qantas Airways	0006
SA	South African Air.	0000
SQ	Singapore Airlines	0000
SR	Swissair	0000
UA	United Airlines	0941



**Noch Fragen?**

