

# FMSync

An Open Source Solution for Synchronising Distributed Archaeological Databases  
in a Centralised Open Access System

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Felix Kußmaul<sup>1</sup>

CAA 2018, Tübingen

21 March 2018

<sup>1</sup>Archaeological Institute, University of Cologne



# Motivation

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FileMaker is widespread across archaeological projects. **Problems:**

- 1 FileMaker products have **expensive license** concepts (Apple)
  - ⇒ everyone just uses the **offline** license FM Pro
- FM Pro does not include mechanisms for sharing or publishing data
  - ⇒ everyone has **independent** database instances
- Independent FM Pro databases cannot simply be merged

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- 3 Independent FM Pro databases cannot simply be merged

# FileMaker Pro: Sharing Data



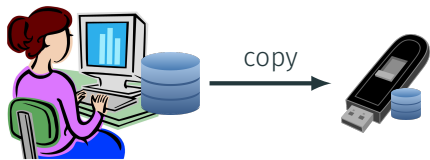
FileMaker A



FileMaker B



# FileMaker Pro: Sharing Data

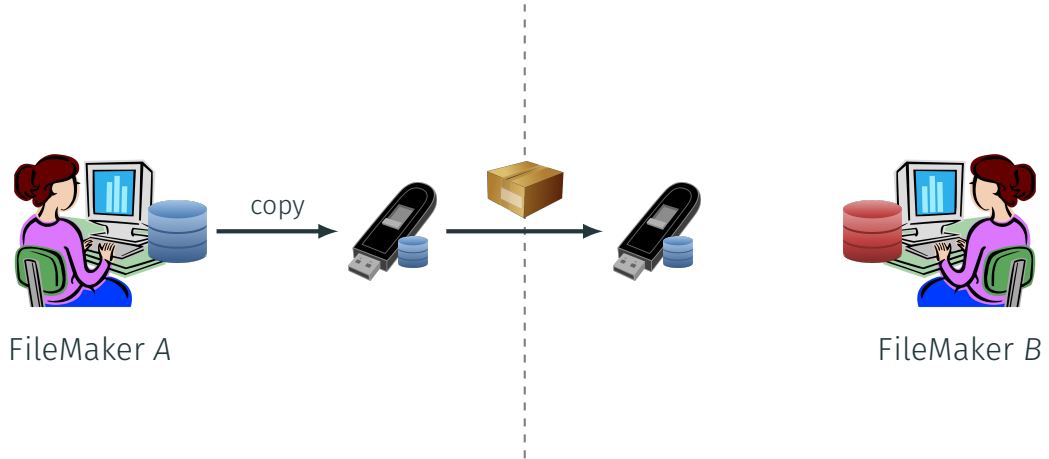


FileMaker A

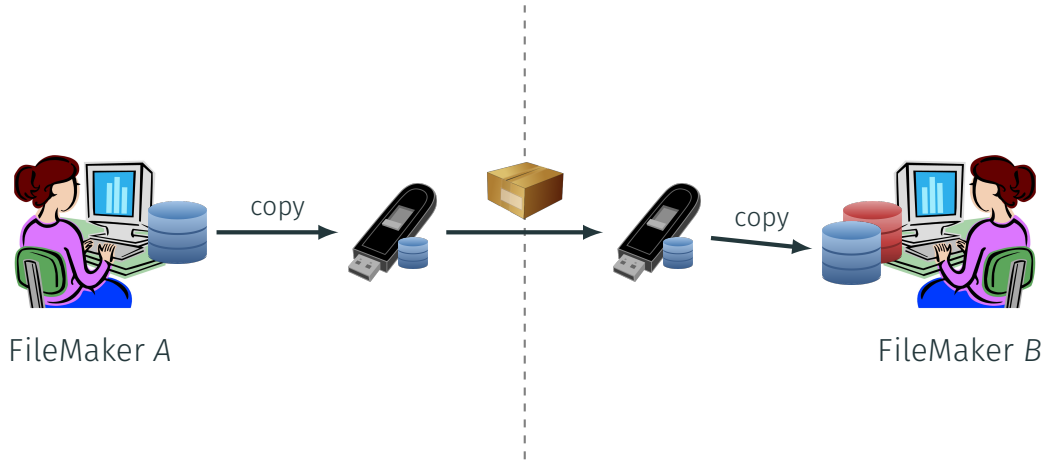


FileMaker B

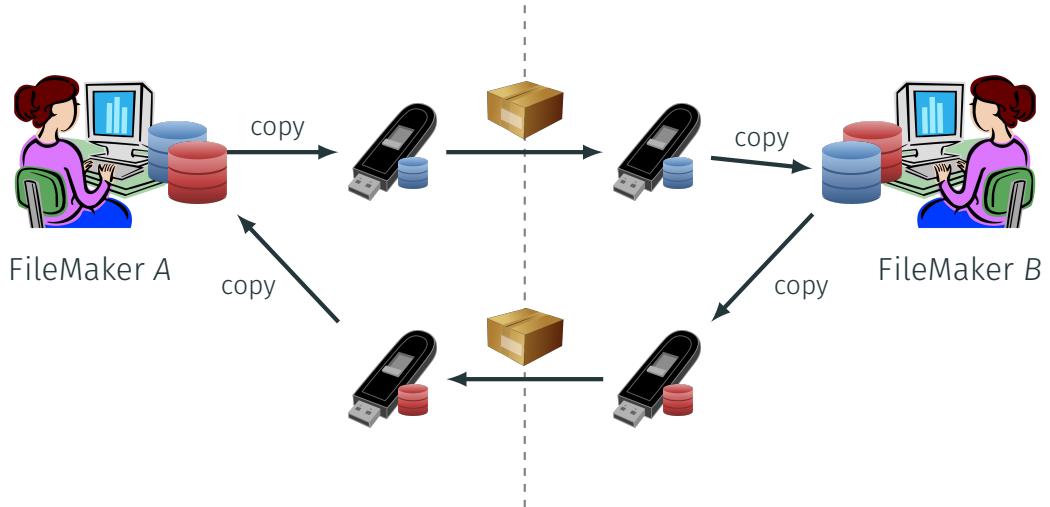
# FileMaker Pro: Sharing Data



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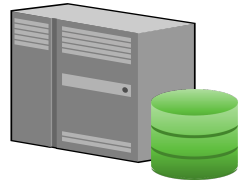
# FileMaker Pro: Sharing Data



# FileMaker Pro: Publishing Data

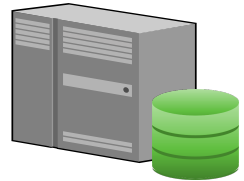


FileMaker



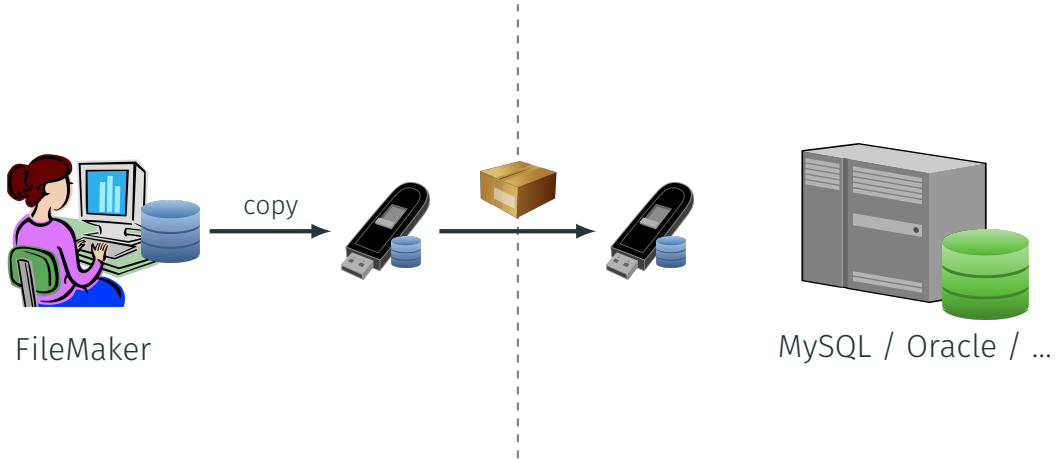
MySQL / Oracle / ...

# FileMaker Pro: Publishing Data

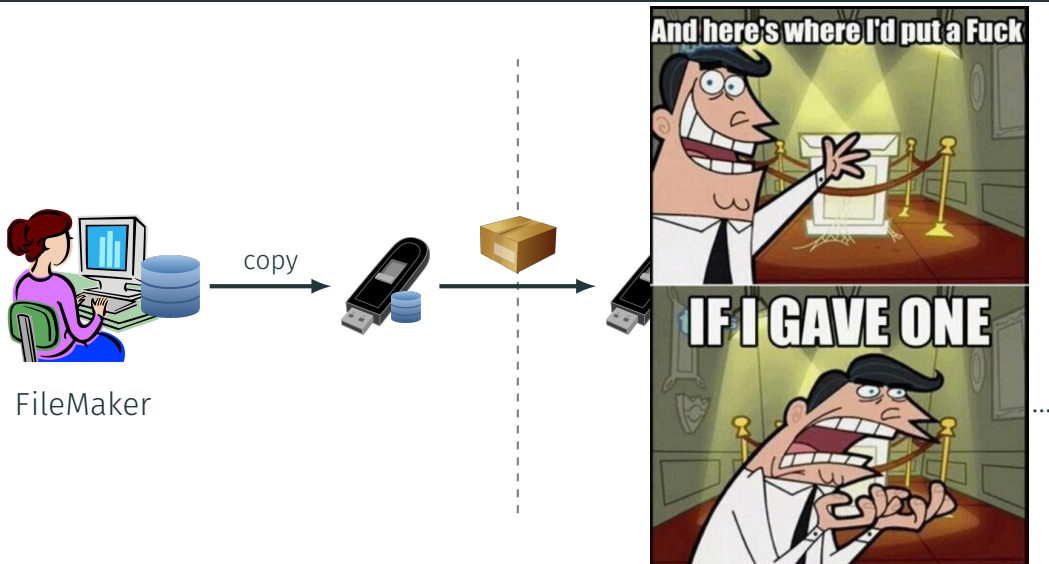


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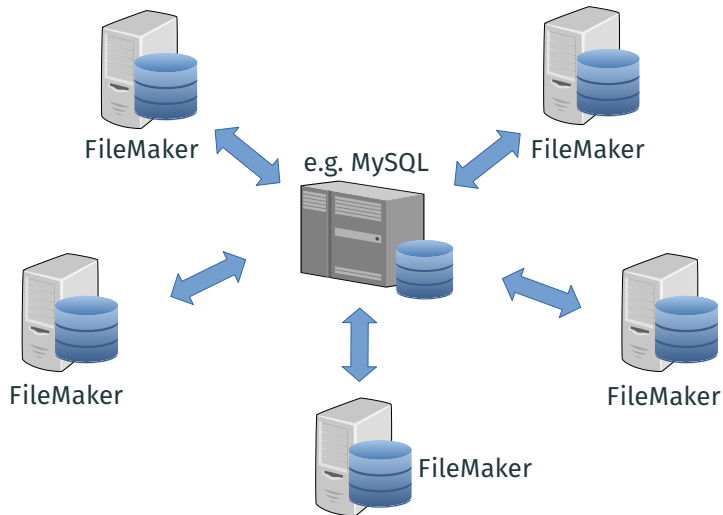




## Approach

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# FMSync: Topology



Yo, Felix! 'Tis nuthin nu.

*SymmetricDS supports [...] Oracle, MySQL, MariaDB, PostgreSQL, MS SQL Server (including Azure), IBM DB2 (UDB, iSeries, and zSeries), H2, HSQLDB, Derby, Firebird, Interbase, Informix, Greenplum, SQLite, Sybase ASE, Sybase ASA (SQL Anywhere), Amazon Redshift, MongoDB, and VoltDB databases.*

<https://www.symmetricds.org/>

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## Purchase Quote

			Quote Date	2018-03-09
			Quote Number	
			Expiration	2018-04-08
	Product	QTY	Unit Price	Extended Price
FM160277LL	FileMaker Server 16 FLT Perpetual Volume License + 1 Year Maintenance (10 users)	1	US\$4,284.00	US\$4,284.00
			Subtotal:	US\$4,284.00
			Shipping:	US\$0.00
			Estimated Tax:	US\$0.00
			Total:	US\$4,284.00

- Proprietary, badly written software
- Still totally not worth the price

... is better than the existing ones, since

- it is **open source** (GPL 3 license)
- it is free
- it allows **open access** scenarios
- it is Java-based, thus **platform-independent** and flexible
- it is user-friendly
- it allows to already **keep data in sync** while collecting

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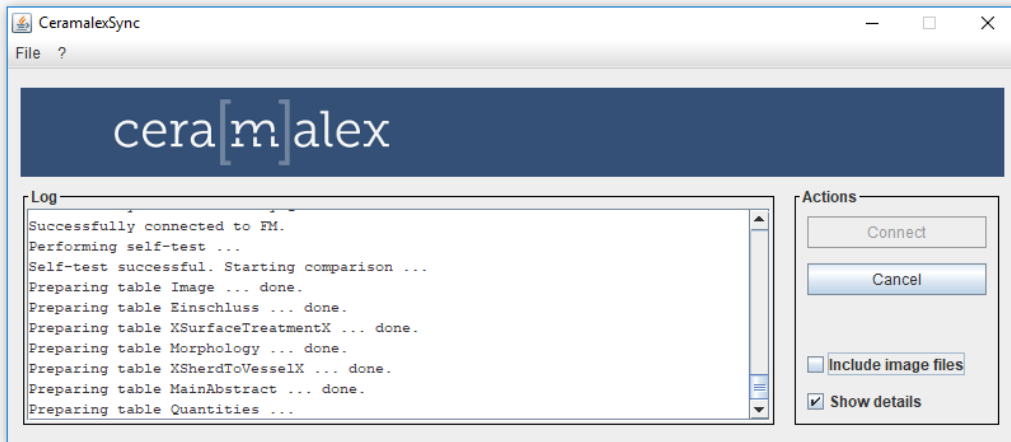
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# Implementation

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# Main Window



# Detail Window

**Sync databases**

**Filters**

!= X Pairs

-> <- Individuals

**Options**

Refresh tables ☒ Show sync relevant fields

Start! Cancel

Fabric Image IsolatedSherdMainAbstract Literaturzitat MainAbstract SurfaceTreatmentAction **XMorphologyX**

A	ArachneEnt...	FS_MainAb...	FS_Morpho...	Level1	Level1_6	Level2	Level3	A	ArachneEnt...	FS_MainAb...	FS_Morpho...	Level1	Level1_6	Level2	Level3
C	14184	2099	Cooking W...	Cooking W...	Vessels fo...	lid or pan		C	22249	14184	2099	Cooking W...	Cooking W...		
C	30772	1541	Domestic f...	Domestic f...	Saqqiah po...			C	23697	30772	1541	Domestic f...	Domestic f...		
C	32121	2134	Transport V...	Transport ...	Amphora	AE 3		C	25046	32121	2134	Transport V...	Transport ...		
C	32945	2054	Transport V...	Transport ...	Amphora	AE 3		C	25870	32945	2054	Transport V...	Transport ...	Amphora	
C	34829	1816	Transport V...	Transport ...	Amphorae			C	27754	34829	1816	Transport V...	Transport ...		
C	36712	1816	Transport V...	Transport ...	Amphorae			C	29637	36712	1816	Transport V...	Transport ...		
C	1	1771	Terrakotta	Terrakotta/...	Bes			C	30580	1	1771	Terrakotta	Terrakotta/...		
C	13	1697						C	30592	13	1697				
C	14	1699						C	30593	14	1699	Fine Ware	Fine Ware/////		
C	29	1721	Lamps	Lamps/////				C	30608	29	1721				
??								??	31934	100032	0				
UL				Fine Ware	Fine Ware/...	Plate									

Select all rows with C

Resolve conflict ...

# Foreign Key Difficulty

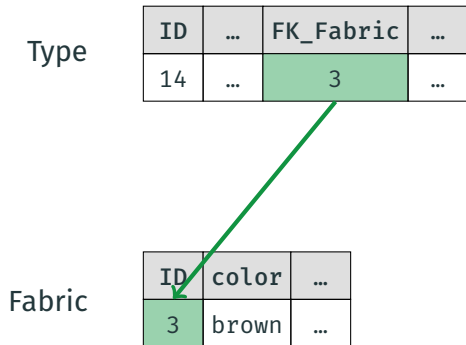
Type

ID	...	FK_Fabric	...
14	...	3	...

Fabric

ID	color	...
3	brown	...

# Foreign Key Difficulty





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Type

ID	...	FK_Fabric	...
14	...	3	...

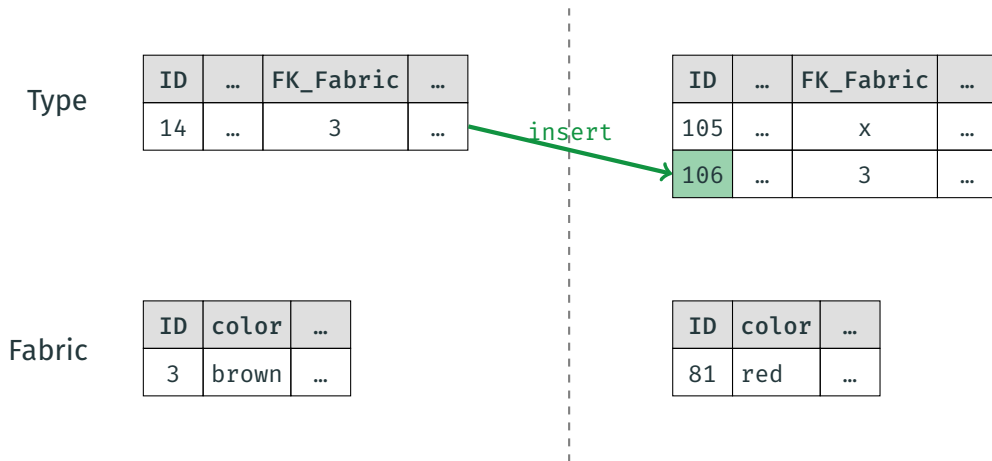
Fabric

ID	color	...
3	brown	...

ID	...	FK_Fabric	...
105	...	x	...

ID	color	...
81	red	...

# Foreign Key Difficulty



# Foreign Key Difficulty

Type

ID	...	FK_Fabric	...
14	...	3	...

ID	...	FK_Fabric	...
105	...	x	...
106	...	3	...

Fabric

ID	color	...
3	brown	...

insert

ID	color	...
81	red	...
82	brown	...

# Foreign Key Difficulty

Type

ID	...	FK_Fabric	...
14	...	3	...

Fabric

ID	color	...
3	brown	...

ID	...	FK_Fabric	...
105	...	x	...
106	...	3	...

ID	color	...
81	red	...
82	brown	...

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Type

ID	...	FK_Fabric	...
14	...	3	...

Fabric

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3	brown	...

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106	...	3	...

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105	...	x	...
106	...	3	...

...

ID	color	...
81	red	...
82	brown	...

# Solution Example

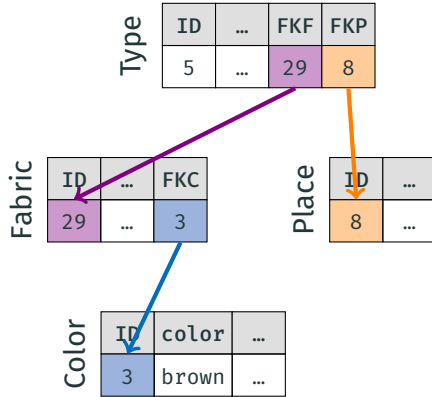
Type	ID	..	FKF	FKP
	5	..	29	8

Fabric	ID	..	FKC
	29	..	3

Place	ID	..
	8	..

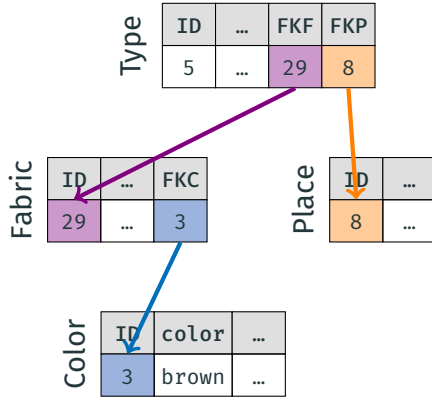
Color	ID	color	..
	3	brown	..

# Solution Example

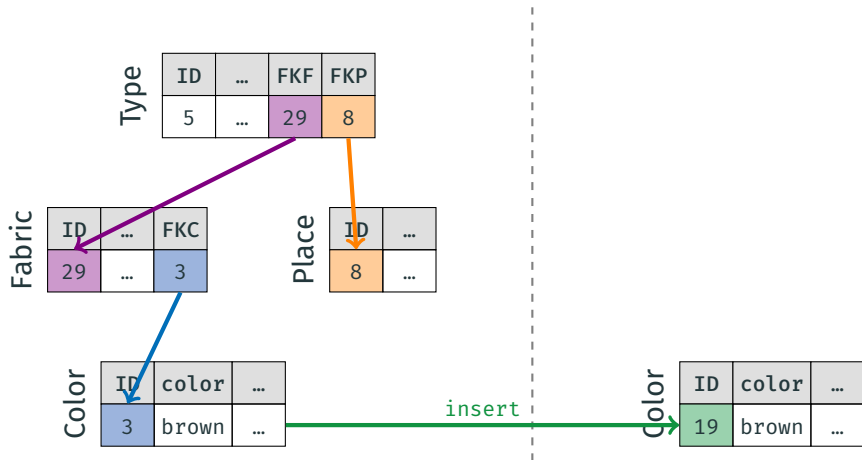




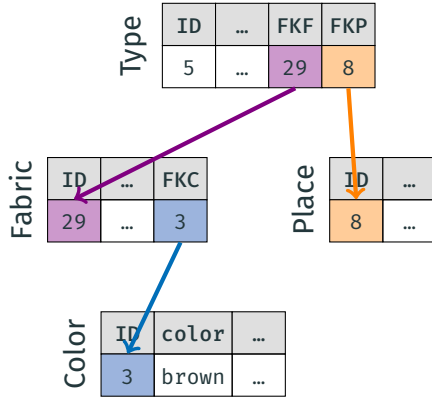
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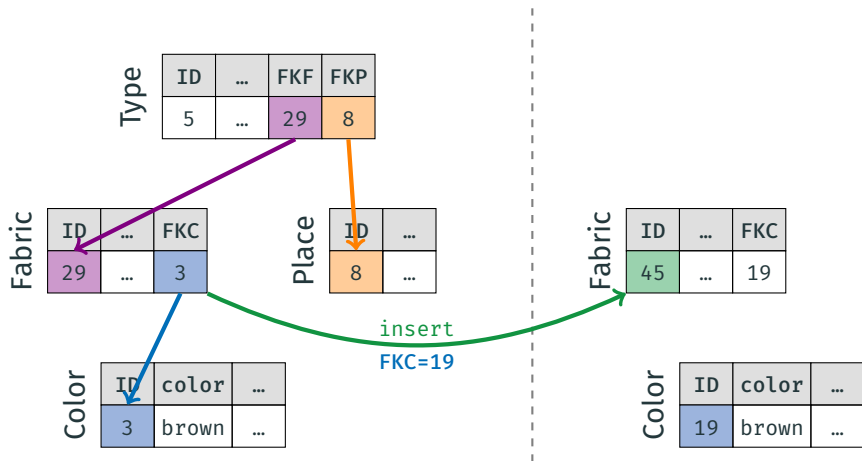


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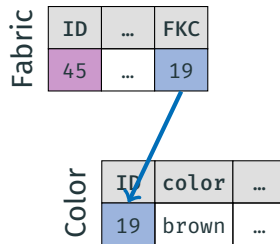
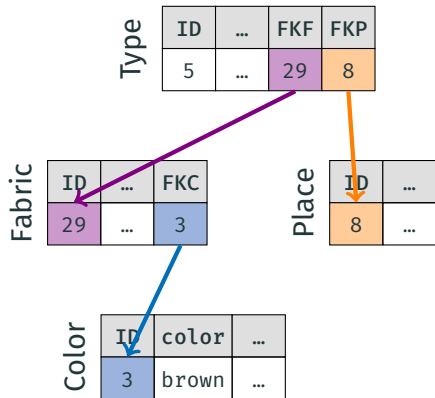


ID	color	...
19	brown	...

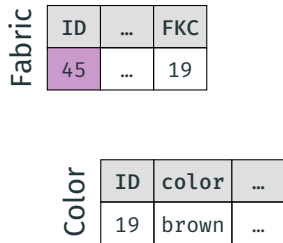
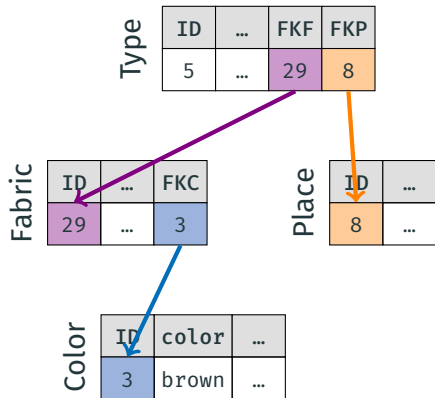
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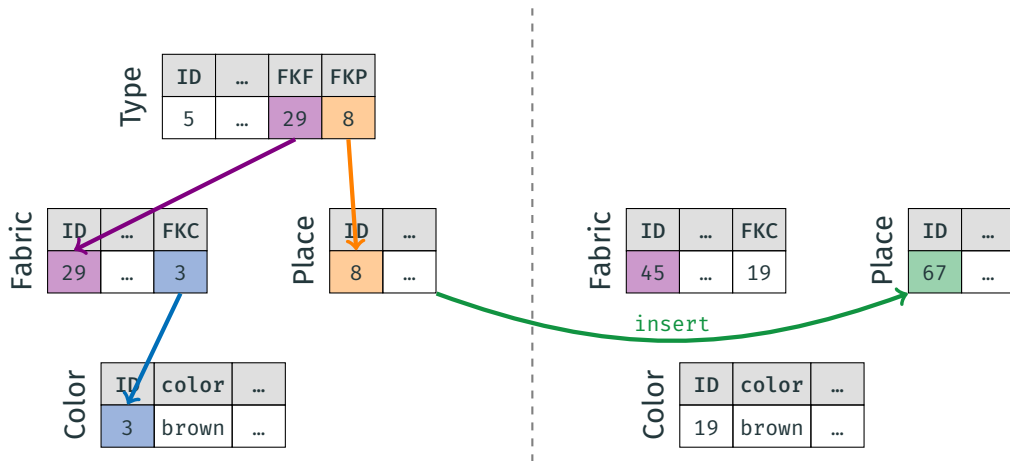
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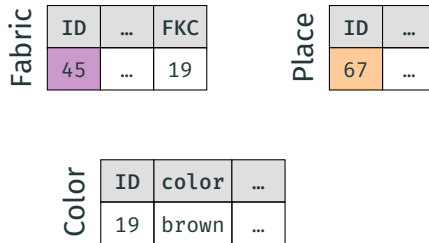
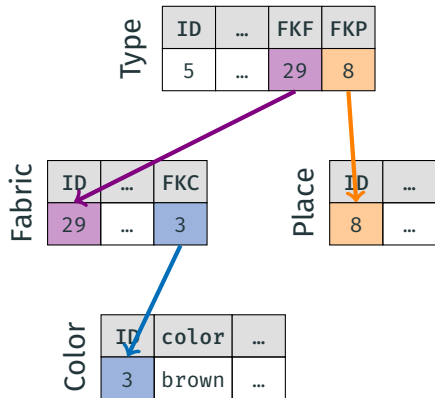
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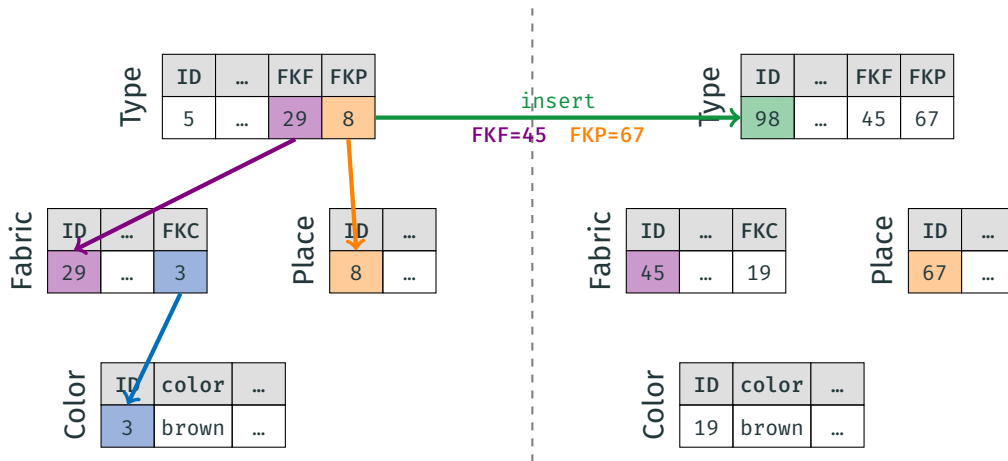


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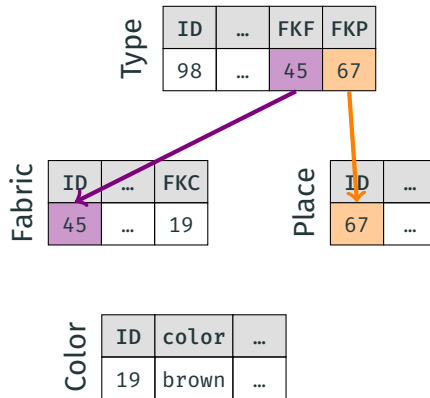
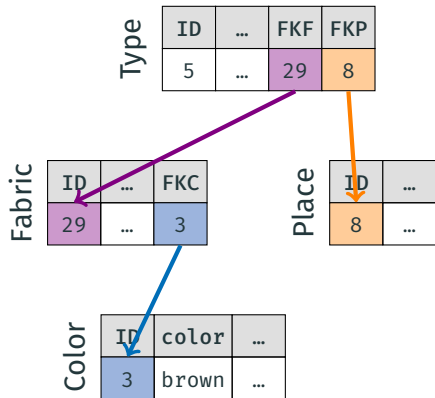




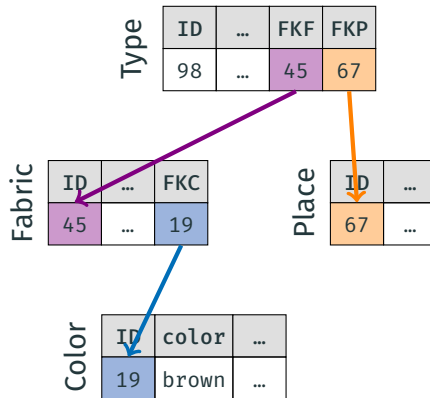
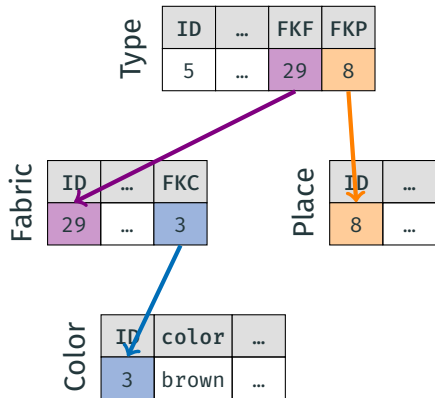
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# Solution Example



# Solution Example





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- Foreign key handling is *not* implemented yet
- Currently designed for CeramEgypt and Arachne, needs generalisation!
- Many things to optimise, e.g. UI behaviour



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Thank you very much for your attention!

Questions?



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## Foreign Key Difficulty: Solution (simplified)

For each new row:

If row contains further FK's, then for each FK:

Jump into referenced table, start over;

Else:

Check for duplicates in target DB and insert row;

Replace returned ID in parent row's FK field;