

A Bidirectional Model-driven Spreadsheet Environment

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Project SSaaPP – SpreadSheets as a Programming Paradigm

MDSheet is a framework for spreadsheet model and spreadsheet data co-evolution, providing several transformations that can be applied to models or data, ensuring that they are always kept synchronized.

The user can update both the Model or the Data.

	A	B	C	D	E	F
1	Budget	Year	year=2010	...	...	...
2	Category	Qty	Cost	Total	...	Total
3	name=""	qty=0	cost=0	total=qty*cost	...	total=SUM(total)
4	...	...	...	total=SUM(total)	...	total=SUM(year.total)
5	...	...	...	total=SUM(total)	...	total=SUM(year.total)

Model

conforms to

	A	B	C	D	E	F	G	H	I
1	Budget	Year	2010	Year	2011	...	...	...	...
2	Category	Qty	Cost	Total	Qty	Cost	Total	...	Total
3	Travel	2	320	640	7	420	2940	...	3580
4	Accommodation	5	140	700	8	185	1480	...	2180
5	...	...	...	...	...	...	...	...	...
6	...	...	...	1340	...	...	4420	...	5760

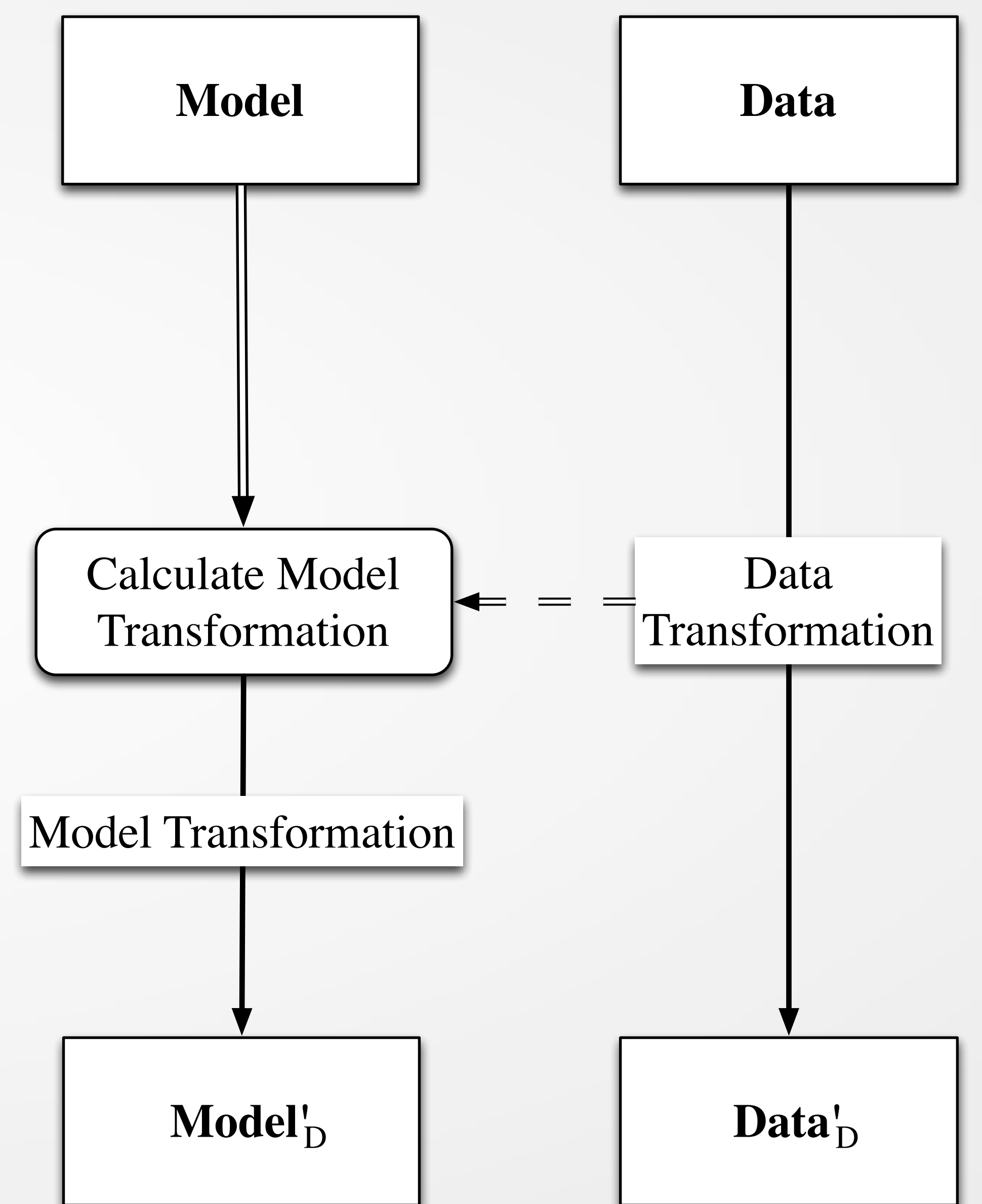
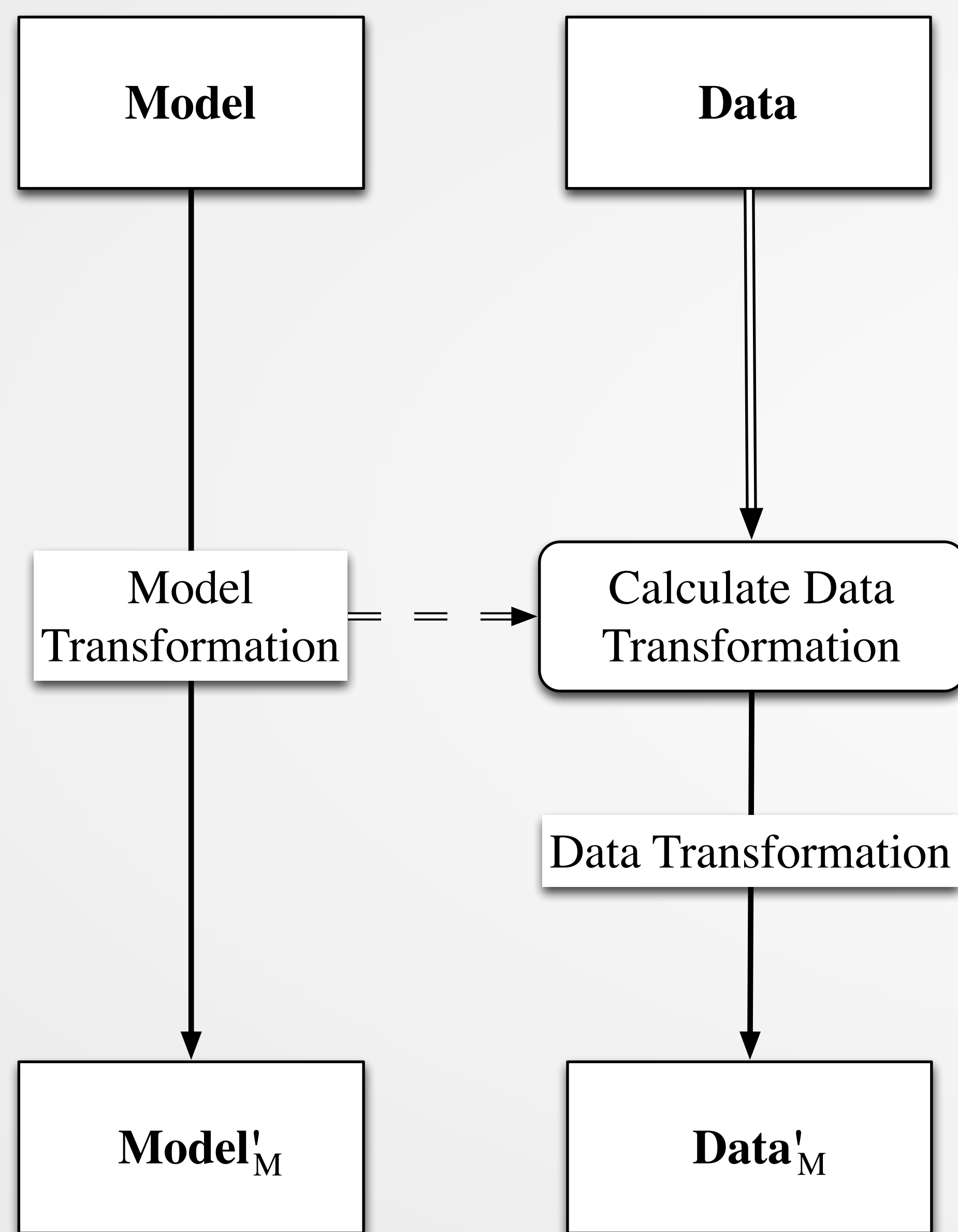
Data

The user presses a button on the spreadsheet system to evolve the object in the current worksheet, i.e., the Model or the Data.

Both Model and Data are sent to the MDSheet back end. If the user updates the Model, a Model Evolution step is performed; otherwise, a Data Evolution step is performed.

Model Evolution

Data Evolution



The transformation is applied to the Model (Model Evolution) or to the Data (Data Evolution).

The transformation for the other artifact is calculated using the previous transformation.

The calculated transformation is applied.

Both the Model and the Data are sent back to the spreadsheet system.

Evolutions are guaranteed to be safe.

The user may perform more evolution steps on the evolved Model and Data.

	A	B	C	D	E	F	G	H	I	J	K
1	Budget	Year	year=2010	Total	Year	year=2010	Discount	Total	...	Total	...
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total	...	Total	...
3	name=""	qty=0	cost=0	total=qty*cost	qty=0	cost=0	disc=0	total=qty*cost*(1-disc)	...	total=SUM(total)	...
4	...	...	...	total=SUM(total)	...	...	...	total=SUM(year.total)	...	total=SUM(year.total)	...
5	...	...	...	total=SUM(total)	...	...	...	total=SUM(year.total)	...	total=SUM(year.total)	...

conforms to

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Budget	Year	2010	Year	2011	Year	2012	...	...	...	...	...	...	...
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total	...	Total	...	...	...	...
3	Travel	2	320	640	7	420	0.1	378	...	3580	...	...	...	...
4	Accommodation	5	140	700	8	185	0	1480	...	3660	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	1340	...	...	...	1856	...	7618	...	...	...	...

Model Evolution

Data Evolution

	A	B	C	D	E	F	G	H	I	J	K
1	Budget	Year	year=2010	Total	Year	year=2010	Discount	Total	...	Total	...
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total	...	Total	...
3	name=""	qty=0	cost=0	total=qty*cost	qty=0	cost=0	disc=0	total=qty*cost*(1-disc)	...	total=SUM(total)	...
4	...	...	...	total=SUM(total)	...	...	...	total=SUM(year.total)	...	total=SUM(year.total)	...
5	...	...	...	total=SUM(total)	...	...	...	total=SUM(year.total)	...	total=SUM(year.total)	...

conforms to

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Budget	Year	2010	Year	2011	Year	2012	...	...	...	...	...	...	...
2	Category	Qty	Cost	Total	Qty	Cost	Discount	Total	...	Total	...	...	...	...
3	Travel	2	320	640	7	420	0.1	378	...	3580	...	...	...	...
4	Accommodation	5	140	700	8	185	0	1480	...	3660	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	1340	...	...	...	1856	...	7618	...	...	...	...

Model Evolution

Data Evolution

Scripted OpenOffice Front End

Bidirectional Haskell Evolution Engine

Scripted OpenOffice Front End