# Relational Lenses: A language for defining updateable views

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## Key Idea

Every expression in the language denotes a bidirectional transformation called a lens (a view definition together with a view update policy).

### **The View Definition Language**

- The sources and targets of lenses are database states (sets of named relations with associated schemas).
- Schemas include predicates and functional dependencies. Both play a significant role in determining view update policies.
- A small set of basic lenses is provided. • Each basic lens corresponds to a simple relational operation. Additional parameters determine view update policies.
- A composite lens expression can be read from left to right to
- describe a composite view definition and from right to left to describe a composite view update policy.

#### A Composite Lens:

join Tracks, Albums deleting from Tracks; project Tracks on Track, Rating, Album, Quantity *with default* {Date=Unknown}; select from Tracks where Quantity > 2

### Static Checking

- We are interested in lenses that are well behaved:
- View definition and update policy "fit together" in a suitable sense.
- Any consistent updated view state is mapped to a consistent updated database state (totality).
- Well-behavedness is guaranteed by static checking.
- Each primitive lens comes with a typing constraint guaranteeing its well-behavedness.
- Well-behavedness of well-typed composite lenses follows by construction.

### **Key Research Challenge**

Detailed design of the basic lenses and their typing constraints.





Benjamin C. Pierce



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Album	Quantity	
Disintegration	6	
Show	3	
Galore	1	
Paris	4	
Wish	5	

Track	Date	Ra
Lullaby	1989	$\mathbf{X}$
Lullaby	1989	
Lovesong	1989	$\mathbf{X}$
Lovesong	1989	$\mathbf{X}$
Trust	1992	$\mathbf{X}$
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Tracks			
Track	Date	Rating	Albu
Lullaby	1989	$\bigstar \bigstar \bigstar$	Galo
Lullaby	1989	$\bigstar \bigstar \bigstar$	Sho
Lovesong	1989	$\mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x}$	Galo
Lovesong	1989	$\mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x}$	Par
Trust	1992	$\mathbf{x} \mathbf{x} \mathbf{x} \mathbf{x}$	Wis



Rating	Album	Qu
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