

## Management

### Lesson 7: Relational Algebra

✓ **Video:** Algebraic Optimization Overview  
6 min

✓ **Video:** Relational Algebra Overview  
4 min

✓ **Video:** Relational Algebra Operators: Union, Difference, Selection  
6 min

✓ **Video:** Relational Algebra Operators: Projection, Cross Product  
4 min

✓ **Video:** Relational Algebra Operators: Cross Product cont'd, Join  
6 min

✓ **Video:** Relational Algebra Operators: Outer Join  
4 min

▶ **Video:** Relational Algebra Operators: Theta-Join  
4 min

### Lesson 8: SQL for Data Science

### Lesson 9: Key Principles of Relational Databases

### Assignment 2: SQL



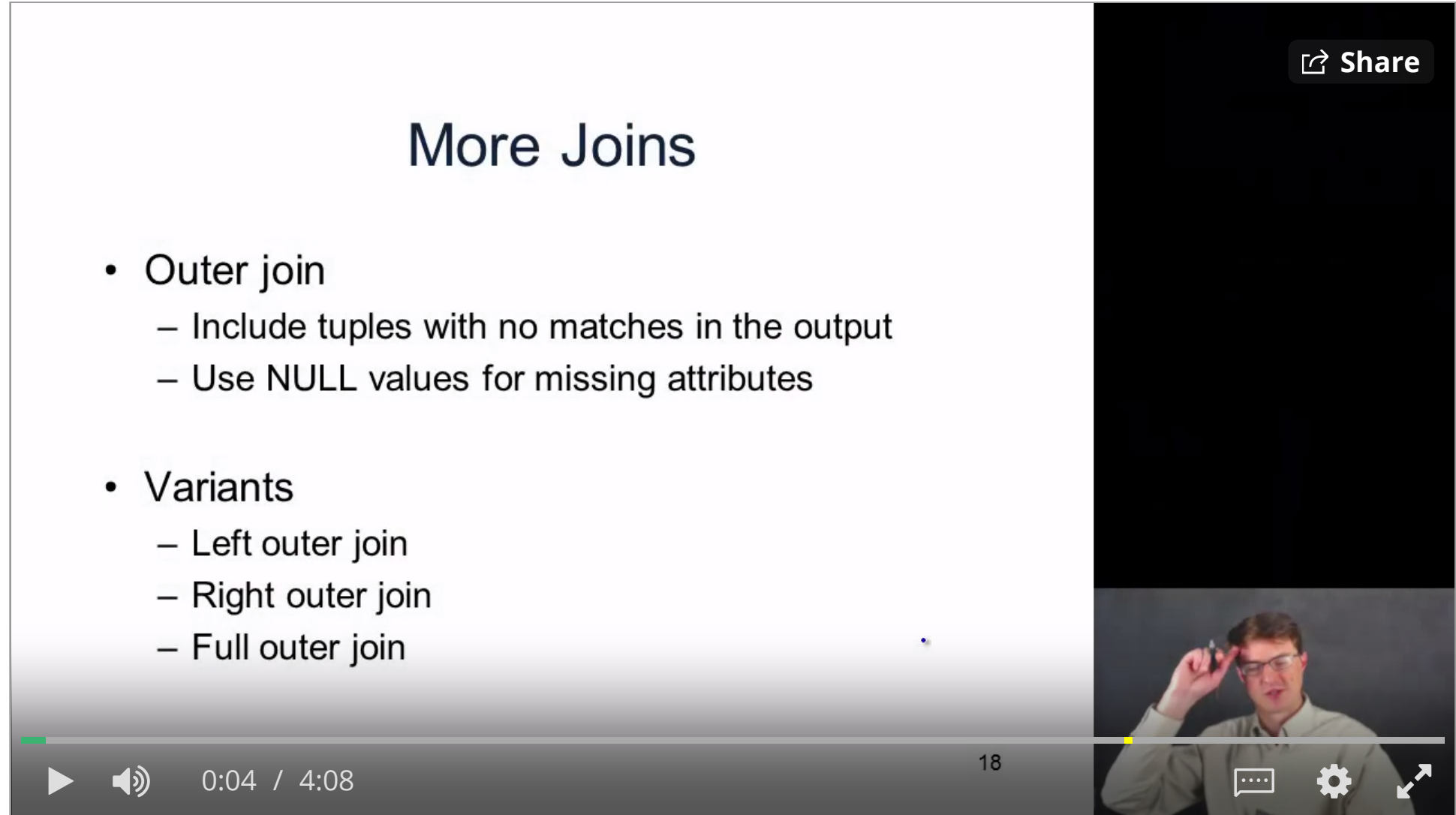
## Relational Algebra Operators: Outer Join



### More Joins

- Outer join
  - Include tuples with no matches in the output
  - Use NULL values for missing attributes
- Variants
  - Left outer join
  - Right outer join
  - Full outer join

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English



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0:00 [MUSIC] **There's other joins.** Another join to recognize that exists is this notion of an outer join. And here, what you're saying is you want all the tuples from the left, R1, R2, we'll write it like this with a sort of missing leg here.

0:25 **You want all the tuples from the left side, if you've written it this way,** and if a tuple on the righthand side matches, great, you put it out and it's just like a regular join. But if there is no match you still include the R1 tuple and you pad out the other columns with null as needed. So any value you don't have, make it a null. All right, and so the variants here that aren't particularly