

O'REILLY®

ADVANCED SQL SERIES

Relational Division

MYSELF

- Teacher
- Data Modeler and Database Designer
- Data Architect
- SQL Developer
- In IT since the 1980's
 - Focusing on SQL and data since 1996
- Cat Hoarder
- Vegan



ADVANCED SQL SERIES

- ❖ Window Functions – August 15, November 13
- ❖ Relational Division – July 9, October 17
- ❖ Coming soon
 - ❖ Temporal Query Techniques
 - ❖ More ...
- ❖ Mastering Relational SQL Querying (2 days)
 - ❖ July 18-19, August 21-22, September 19-20

AGENDA

- ❖ Introduction to relational division
- ❖ The HR demo database
- ❖ Various solutions to relational division
- ❖ Advanced relational division challenges
 - ❖ As time permits
- ❖ Methodology

RELATIONAL ALGEBRA .01

- ❖ A family of algebras with well founded semantics
- ❖ Used for the relational model of data, and the queries to retrieve and manipulate it
- ❖ The theoretical foundation for SQL and RDBMS

RELATIONAL ALGEBRA SET THEORY OPERATORS

- ❖ Set Union $\sim =$ UNION [ALL]
- ❖ Set Difference $\sim =$ EXCEPT
- ❖ Cartesian Product $\sim =$ CROSS JOIN

CARTESIAN PRODUCT X

- ❖ A mathematical operation that returns a product set from multiple sets with ordered pairs of every possible combination

CARTESIAN PRODUCT X

Boys

Boy
Jim
Ron

Girls

Girl
Jill
Cindy

Boys X Girls

Meetings

Boy	Girl
Jim	Jill
Jim	Cindy
Ron	Jill
Ron	Cindy

CARTESIAN PRODUCT



DIVISION \div

- ❖ $R \div S$ is a binary operation that returns the **restrictions** of tuples in R , to the attribute names **unique** to R , for which it holds that **all their combinations** with tuples in S **are present** in R
- ❖ SQL does not have a DIVIDE operator

DIVISION ÷

Boys

Boy
Jim
Ron

Girls

Girl
Jill
Cindy

Boys X Girls

Meetings

Boy	Girl
Jim	Jill
Jim	Cindy
Ron	Jill
Ron	Cindy

DIVISION ÷ EXACT

Meetings

Boy	Girl
Jim	Jill
Jim	Cindy
Ron	Jill
Ron	Cindy

Meetings ÷ Boys

Boys

Boy
Jim
Ron

Result

Girl
Jill
Cindy

DIVISION ÷ WITH REMAINDER

Meetings

Boy	Girl
Jim	Jill
Jim	Cindy
Ron	Jill
Ron	Cindy
Steve	Jill
Ron	Shirley

Meetings ÷ Boys

Boys

Boy
Jim
Ron

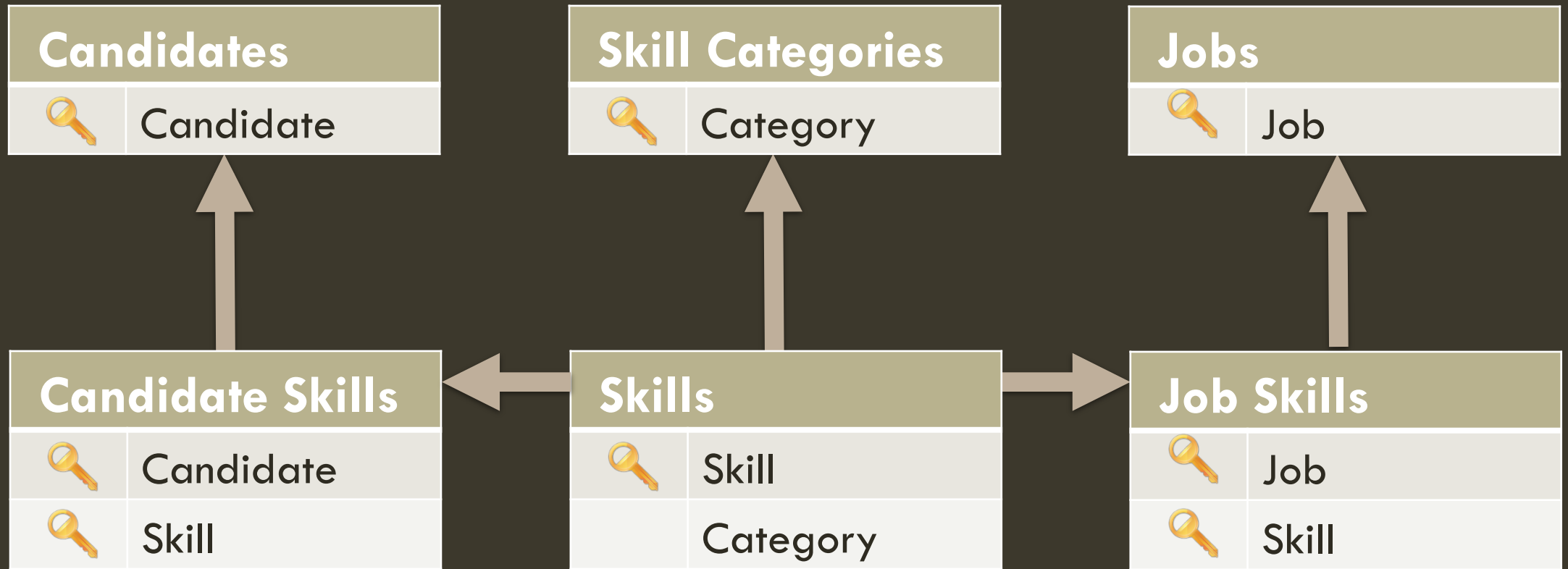
Result

Girl
Jill
Cindy

QUICK Q&A – WHAT IS RELATIONAL DIVISION



OUR DEMO DATABASE



OUR SAMPLE DATA

Candidate	Skill
Ami	DB Design
Ami	Passionate
Ami	SQL
Ami	Team Player
Darrin	C#
Darrin	DB Design
Darrin	Java
Darrin	Leader
Darrin	Passionate
Darrin	Python
Darrin	SQL

Job	Skill
DB Architect	DB Design
DB Architect	Passionate
DB Architect	Python
DB Architect	SQL
DB Architect	Team Player
Front End Developer	C#
Front End Developer	Java
Front End Developer	Passionate
Front End Developer	Team Player
Office Manager	Office
Office Manager	Passionate

CREATE HR DEMO DATABASE



EXERCISE – BUILD HR ENVIRONMENT



RELATIONAL DIVISION USING SET OPERATORS



EXERCISE – USING SET OPERATORS



RELATIONAL DIVISION USING COUNTS



EXERCISE – USING COUNTS



BREAK



RELATIONAL DIVISION WITH JOINS



EXERCISE – USING JOINS



| Q&A – SET OPERATORS, COUNTS, JOINS



RELATIONAL DIVISION WITH NESTED NOT EXISTS



EXERCISE – USING NESTED NOT EXISTS



ADVANCED RELATIONAL DIVISIONS

- ❖ Todd's division
- ❖ Romley's division
- ❖ Ordered division

ADVANCED RELATIONAL DIVISIONS



REVIEW

- ❖ Introduction to relational division
- ❖ Various solutions to relational division
 - ❖ EXCEPT, COUNT, NOT EXISTS
- ❖ Advanced relational division challenges
 - ❖ As time permits
- ❖ Methodology

| Q&A – NESTED NOT EXISTS,
ADVANCED DIVISIONS



COURSE EVALUATIONS



TAKE HOME EXERCISE



ADDITIONAL RESOURCES

[https://www.safaribooksonline.com/search/?
query=relational%20algebra](https://www.safaribooksonline.com/search/?query=relational%20algebra)

O'REILLY®

ADVANCED SQL SERIES

Relational Division

Thank you
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