

A decorative graphic on the left side of the slide, consisting of a network of white lines and circles on a blue gradient background, resembling a circuit board or a neural network.

# WEEK 6

## DOMAIN RELATIONAL CALCULUS

CS3319

# STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - Write a domain relational calculus expression that requires a join
  - Show what rows would be returned when given a domain relational calculus expression

# DOMAIN RELATIONAL CALCULUS

- In Domain Calculus an expression is of the form:

$\{x_1, x_2, \dots, x_n \mid \text{COND}(x_1, x_2, \dots, x_n, x_{n+1}, \dots, x_{n+m})\}$

- Retrieve the birth date and address of the employee whose name is 'Jon R. Mortensen' :

$\{u, v \mid (\exists q)(\exists r)(\exists s) (\text{EMPLOYEE}(qrstuvwxyz) \text{ and } q = \text{'Jon'} \text{ and } r = \text{'R.'} \text{ and } s = \text{'Mortensen'})\}$

or alternative notation would be:

$\{u, v \mid \text{EMPLOYEE}(\text{'Jon'}, \text{'R.'}, \text{'Mortensen'}, t, u, v, w, x, y, z)\}$

Employee

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
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Department

<u>DName</u>	<u>DNumber</u>	MGRSSN*	MgrStartDate
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Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
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DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
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Project

<u>PName</u>	<u>PNumber</u>	Plocation	Dnum*
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Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
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# DOMAIN CALCULUS EXAMPLES

- For every project located in 'London', list the project number, the controlling department number, and the department manager's last name.

$\{i,k,s \mid (\exists j) (\text{PROJECT}(hijk) \text{ and } (\exists t)(\text{EMPLOYEE}(qrstuvwxyz) \text{ and } (\exists b) (\exists c)(\text{DEPARTMENT}(abcd) \text{ and } k=b \text{ and } c=t \text{ and } j=\text{'London'}))))\}$

- Find the name of employees who have no dependents

$\{q,s \mid (\exists t) (\text{EMPLOYEE}(qrstuvwxyz) \text{ and } (\text{not } (\exists l) \text{DEPENDENT}(lmnop) \text{ and } t=l))))\}$

OR

$\{q,s \mid (\exists t) (\text{EMPLOYEE}(qrstuvwxyz) \text{ and } (\forall l) (\text{not } (\text{DEPENDENT}(lmnop) \text{ or not}(t=l))))\}$

## Employee

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
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## Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
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## Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
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## DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
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## Project

PName	<u>PNumber</u>	Plocation	Dnum*
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## Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
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- Find

{q,s |

and

OR

{q,s |

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or not( $\tau=1$ )))}

## Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
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## Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
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## DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
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## Project

PName	<u>PNumber</u>	Plocation	Dnum*
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## Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
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nop)

23 5



**QUESTION:** List the names of managers who have at least one dependent:

$\{q,s \mid (\exists t)(\text{EMPLOYEE}(qrstuvwxy\text{z}) \text{ and } (\exists c)(\text{DEPARTMENT}(abcd) \text{ and } (\exists l)(\text{DEPENDENT}(lmnop) \text{ and } c=t \text{ and } l=t))))\}$

**Employee**

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
q	r	s	t	u	v	w	x	y	z

**Department**

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
a	b	c	d

**Works On**

<u>ESSN*</u>	<u>PNO*</u>	Hours
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**DepartmentLocation**

<u>Dnumber*</u>	<u>Dlocation</u>
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**Project**

PName	<u>PNumber</u>	Plocation	Dnum*
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**Dependent**

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
l	m	n	o	p

# REVIEW

**AA**

A <sup>h</sup>	B <sup>i</sup>	C <sup>j</sup>
Pig	22	Pink
Cat	22	Green
Cat	55	Blue

**BB**

A <sup>m</sup>	B <sup>n</sup>	C <sup>o</sup>	D <sup>p</sup>
Pig	22	Blue	14
Cat	22	Green	33
Cat	22	Blue	22

$\{h \mid (\exists j)(AA(hij) \text{ and } j = \text{"Pink"})\}$

$\{h, m, p \mid (\exists i)(AA(hij) \text{ and } (\exists n)(\exists o)(BB(mnop) \text{ and } i = n \text{ and } o = \text{"Blue"}))\}$

A
Pig

AA.A	BB.A	D
Pig	Pig	14
Pig	Cat	22
Cat	Pig	14
Cat	Cat	22