

## Relational Algebra

### 1. Select Nama, Alamat, and Gaji from employee in "Research" department.

1.  $\text{Employee\_Departement} \leftarrow \text{Employee} \bowtie \text{Departement}$   
(Natural Join)

NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)	DNO int	Dname varchar(20)	NOKTP_MGR varchar(10)	TglMulai_MGR date
John	B	Smith	123456789	731 Fondren, Houston, TX	30000	L	333445555	5	Research	333445555	1988-05-22
Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5	Research	333445555	1988-05-22
Alicia	J	Zelaya	999887777	3321 Castle, Spring, TX	25000	P	987654321	4	Administration	987654321	1995-01-01
Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555	4	Administration	987654321	1995-01-01
Ramesh	K	Narayan	666884444	975 Fire Oak, Humble, TX	38000	L	333445555	5	Research	333445555	1988-05-22
Joyce	A	English	453453453	5631 Rice, Houston, TX	25000	P	333445555	5	Research	333445555	1988-05-22
Ahmad	V	Jabbar	987987987	980 Dallas, Houston, TX	25000	L	987654321	4	Administration	987654321	1995-01-01
James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)	1	HeadQuarters	888665555	1981-06-19

### 2. $\text{Research\_Employee} \leftarrow \sigma_{\text{Dname}='Research'}(\text{Employee\_Departement})$

NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)	DNO int	Dname varchar(20)	NOKTP_MGR varchar(10)	TglMulai_MGR date
John	B	Smith	123456789	731 Fondren, Houston, TX	30000	L	333445555	5	Research	333445555	1988-05-22
Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5	Research	333445555	1988-05-22
Ramesh	K	Narayan	666884444	975 Fire Oak, Humble, TX	38000	L	333445555	5	Research	333445555	1988-05-22
Joyce	A	English	453453453	5631 Rice, Houston, TX	25000	P	333445555	5	Research	333445555	1988-05-22

### 3. $\text{Hasil} \leftarrow \pi_{\text{NmDepan, NmBelakang, Alamat, Gaji}}(\text{Research\_Employee})$

nmdepan varchar(20)	nmbelakang varchar(20)	alamat varchar(50)	gaji int
John	Smith	731 Fondren, Houston, TX	30000
Franklin	Wong	638 Voss, Houston, TX	40000
Ramesh	Narayan	975 Fire Oak, Humble, TX	38000
Joyce	English	5631 Rice, Houston, TX	25000

### 2. Select nama, alamat, and noKTP from employee that is a supervisor of other employees.

## 1. SupervisorNoKTP $\leftarrow \pi_{\text{NoKTPKepala}} (\text{Employee})$

NoKTPKepala varchar(15)
333445555
888665555
987654321
888665555
333445555
333445555
987654321
(NULL)

## 2. Supervisor $\leftarrow \sigma_{\text{NoKTP in NOKTP\_MGR}} (\text{Employee})$

NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)	DNO int
Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5
Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555	4
James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)	1

## 3. Hasil $\leftarrow \pi_{\text{NmDepan, NmBelakang, Alamat, NoKTP}} (\text{Supervisor})$

nmdepan varchar(20)	nmbelakang varchar(20)	alamat varchar(50)	NoKTP varchar(10)
Franklin	Wong	638 Voss, Houston, TX	333445555
Jennifer	Wallace	291 Berry, Bellaire, TX	987654321
James	Borg	450 Stone, Houston, TX	888665555

## 3. Select nama and noKTP from employee with its supervisor's nama and noKTP.

### 1. Employee\_Supervisor $\leftarrow \text{Employee} \bowtie \text{Employee.NoKTPKepala} = \text{Employee.NoKTP}$ (Equi-join)

NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)	DNO int	nmadepan varchar(20)	singkatan varchar(1)	namabelakang varchar(20)	NomorkTP varchar(10)	Alamat_supervisor varchar(50)	gaji_supervisor int	JenisKelamin_supervisor varchar(1)	NoKTPKepala_supervisor varchar(15)	DNO_supervisor int
John	B	Smith	123456789	731 Fondren, Houston, TX	30000	L	333445555	5	Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5
Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5	James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)	1
Alicia	J	Zelaya	999887777	3321 Castle, Spring, TX	25000	P	987654321	4	Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555	4
Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555	4	James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)	1
Ramesh	K	Narayan	666884444	975 Fire Oak, Humble, TX	38000	L	333445555	5	Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5
Joyce	A	English	453453453	5631 Rice, Houston, TX	25000	P	333445555	5	Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555	5
Ahmad	V	Jabbar	987987987	980 Dallas, Houston, TX	25000	L	987654321	4	Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555	4
James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)	1	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)	(NULL)

### 2. Hasil(Nama\_Employee, NoKTP\_Employee, Nama\_Supervisor, NoKTP\_Supervisor) $\leftarrow \pi_{\text{Nama\_Employee, NoKTP\_Employee, Nama\_Supervisor, NoKTP\_Supervisor}} (\text{Employee\_Supervisor})$

Nama_Employee varchar(41)	NoKTP_Employee varchar(10)	Nama_Supervisor varchar(41)	NoKTP_Supervisor varchar(10)
John Smith	123456789	Franklin Wong	333445555
Franklin Wong	333445555	James Borg	888665555
Alicia Zelaya	999887777	Jennifer Wallace	987654321
Jennifer Wallace	987654321	James Borg	888665555
Ramesh Narayan	666884444	Franklin Wong	333445555
Joyce English	453453453	Franklin Wong	333445555
Ahmad Jabbar	987987987	Jennifer Wallace	987654321
James Borg	888665555	(NULL)	(NULL)

#### 4. Select nama, alamat, and noKTP that is a manager in Department 4.

- Departement\_Manager  $\leftarrow$  Departement  $\bowtie$  Departement.NOKTP\_MGR = Employee.NoKTP (Equi-join)

Dname varchar(20)	Dnomor int	NOKTP_MGR varchar(10)	TglMulai_MGR date	NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)
Research	5	333445555	1988-05-22	Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555
Administration	4	987654321	1995-01-01	Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555
HeadQuarters	1	888665555	1981-06-19	James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)

- Hasil  $\leftarrow \pi_{\text{Nama, Alamat, NoKTP}}(\sigma_{\text{Dnomor}=4}(\text{Departement\_Manager}))$

Nama varchar(41)	Alamat varchar(50)	NoKTP varchar(10)
Jennifer Wallace	291 Berry, Bellaire, TX	987654321

#### 5. Select nama, alamat, and nama\_proyek from employee that works in "ProductZ" project.

- Employee\_Project  $\leftarrow$  Bekerja\_Pada  $\bowtie$  Bekerja\_Pada.NoKTP = Employee.NoKTP  $\bowtie$  Bekerja\_Pada.Pnomor = Project.Pnomor

NoKTP varchar	Pnomor int	LamaJam newdecimal	NmDepan varchar	Inisial varchar	NmBelakang varchar	NoKTP varchar	Alamat varchar	Gaji int	JenisKelamin varchar	NoKTPKepala varchar	DNO int	Pnama varchar	Pnomor int	Plokasi varchar	Dnum int
123456789	2	7.5	John	B	Smith	123456789	731 Fondren, H	30000	L	333445555	5	ProductY	2	Sugarland	5
123456789	1	32.5	John	B	Smith	123456789	731 Fondren, H	30000	L	333445555	5	ProductX	1	Bellaire	5
333445555	20	10.0	Franklin	T	Wong	333445555	638 Voss, Hou	40000	L	888665555	5	Reorganization	20	Houston	1
333445555	10	10.0	Franklin	T	Wong	333445555	638 Voss, Hou	40000	L	888665555	5	Computerizati	10	Stafford	4
333445555	3	10.0	Franklin	T	Wong	333445555	638 Voss, Hou	40000	L	888665555	5	ProductZ	3	Houston	5
333445555	2	10.0	Franklin	T	Wong	333445555	638 Voss, Hou	40000	L	888665555	5	ProductY	2	Sugarland	5
999887777	30	10.0	Alicia	J	Zelaya	999887777	3321 Castle, S	25000	P	987654321	4	Newbenefits	30	Stafford	4
999887777	30	30.0	Alicia	J	Zelaya	999887777	3321 Castle, S	25000	P	987654321	4	Newbenefits	30	Stafford	4
987654321	20	15.0	Jennifer	S	Wallace	987654321	291 Berry, Bell	43000	P	888665555	4	Reorganization	20	Houston	1
987654321	30	20.0	Jennifer	S	Wallace	987654321	291 Berry, Bell	43000	P	888665555	4	Newbenefits	30	Stafford	4
666884444	3	40.0	Ramesh	K	Narayan	666884444	975 Fire Oak, H	38000	L	333445555	5	ProductZ	3	Houston	5
453453453	2	20.0	Joyce	A	English	453453453	5631 Rice, Hou	25000	P	333445555	5	ProductY	2	Sugarland	5
453453453	1	20.0	Joyce	A	English	453453453	5631 Rice, Hou	25000	P	333445555	5	ProductX	1	Bellaire	5
987987987	30	5.0	Ahmad	V	Jabbar	987987987	980 Dallas, Hou	25000	L	987654321	4	Newbenefits	30	Stafford	4
987987987	10	35.0	Ahmad	V	Jabbar	987987987	980 Dallas, Hou	25000	L	987654321	4	Computerizati	10	Stafford	4
888665555	20	(NULL)	James	E	Borg	888665555	450 Stone, Hou	55000	L	(NULL)	1	Reorganization	20	Houston	1

- Hasil  $\leftarrow \pi_{\text{Nama, Alamat, Nama\_Proyek}}(\sigma_{\text{Nama\_proyek} = \text{'ProductZ'}}(\text{Employee\_Project}))$

Nama varchar	Alamat varchar	nama_proyek varchar
Franklin Wong	638 Voss, Houston, TX	ProductZ
Ramesh Narayan	975 Fire Oak, Humble, TX	ProductZ

6. Select nama\_proyek controlled by "Research" department.

1.  $\text{Proyek\_Departement} \leftarrow \text{Project} \bowtie \text{Project.Dnum} = \text{Departement.Dnomor}$

Pnama varchar(20)	Pnomor int	Plokasi varchar(20)	Dnum int	Dname varchar(20)	Dnomor int	NOKTP_MGR varchar(10)	TglMulai_MGR date
ProductX	1	Bellaire	5	Research	5	333445555	1988-05-22
ProductY	2	Sugarland	5	Research	5	333445555	1988-05-22
ProductZ	3	Houston	5	Research	5	333445555	1988-05-22
Computerization	10	Stafford	4	Administration	4	987654321	1995-01-01
Reorganization	20	Houston	1	HeadQuarters	1	888665555	1981-06-19
Newbenefits	30	Stafford	4	Administration	4	987654321	1995-01-01

2.  $\text{Hasil} \leftarrow \pi_{\text{Nama\_Proyek}} (\sigma_{\text{Dname} = \text{'Research'}} (\text{Employee\_Project}))$

Nama_Projek varchar(20)
ProductX
ProductY
ProductZ

7. Select nama\_proyek located in "Houston" or "Stafford".

1.  $\text{Hasil} \leftarrow \pi_{\text{Nama\_Proyek}} (\sigma_{\text{Plokasi} = \text{'Houston'}} \vee \text{Plokasi} = \text{'Stafford'}} (\text{Project}))$

Nama_Projek varchar(20)
ProductZ
Computerization
Reorganization
Newbenefits

8. Select name and location of the project which "John" work on it.

1.  $\text{Employee\_Project} \leftarrow \text{Bekerja\_Pada} \bowtie \text{Bekerja\_Pada.NoKTP} = \text{Employee.NoKTP}$

$\text{Bekerja\_Pada.Pnomor} = \text{Project.Pnomor}$

NoKTP varchar	Pnomor int	LamaJam newdecimal	NmDepan varchar	Inisial varchar	NmBelakang varchar	NoKTP varchar	Alamat varchar	Gaji int	JenisKelamin varchar	NoKTPKepala varchar	DNO int	Pnama varchar	Pnomor int	Plokasi varchar	Dnum int
123456789	2	7.5	John	B	Smith	123456789	731 Fondren, H	30000	L	333445555	5	ProductY	2	Sugarland	5
123456789	1	32.5	John	B	Smith	123456789	731 Fondren, H	30000	L	333445555	5	ProductX	1	Bellaire	5
333445555	20	10.0	Franklin	T	Wong	333445555	638 Voss, Hous	40000	L	888665555	5	Reorganization	20	Houston	1
333445555	10	10.0	Franklin	T	Wong	333445555	638 Voss, Hous	40000	L	888665555	5	Computerizatio	10	Stafford	4
333445555	3	10.0	Franklin	T	Wong	333445555	638 Voss, Hous	40000	L	888665555	5	ProductZ	3	Houston	5
333445555	2	10.0	Franklin	T	Wong	333445555	638 Voss, Hous	40000	L	888665555	5	ProductY	2	Sugarland	5
999887777	30	10.0	Alicia	J	Zelaya	999887777	3321 Castle, Sp	25000	P	987654321	4	Newbenefits	30	Stafford	4
999887777	30	30.0	Alicia	J	Zelaya	999887777	3321 Castle, Sp	25000	P	987654321	4	Newbenefits	30	Stafford	4
987654321	20	15.0	Jennifer	S	Wallace	987654321	291 Berry, Bell	43000	P	888665555	4	Reorganization	20	Houston	1
987654321	30	20.0	Jennifer	S	Wallace	987654321	291 Berry, Bell	43000	P	888665555	4	Newbenefits	30	Stafford	4
666884444	3	40.0	Ramesh	K	Narayan	666884444	975 Fire Oak, F	38000	L	333445555	5	ProductZ	3	Houston	5
453453453	2	20.0	Joyce	A	English	453453453	5631 Rice, Hou	25000	P	333445555	5	ProductY	2	Sugarland	5
453453453	1	20.0	Joyce	A	English	453453453	5631 Rice, Hou	25000	P	333445555	5	ProductX	1	Bellaire	5
987987987	30	5.0	Ahmad	V	Jabbar	987987987	980 Dallas, Hou	25000	L	987654321	4	Newbenefits	30	Stafford	4
987987987	10	35.0	Ahmad	V	Jabbar	987987987	980 Dallas, Hou	25000	L	987654321	4	Computerizatio	10	Stafford	4
888665555	20	(NULL)	James	E	Borg	888665555	450 Stone, Hou	55000	L	(NULL)	1	Reorganization	20	Houston	1

2.  $\text{Hasil} \leftarrow \pi_{\text{Nama\_Proyek}, \text{Location}} (\sigma_{\text{NmDepan} = 'John'} (\text{Employee\_Project}))$

Nama_Project varchar	Location varchar
ProductX	Bellaire
ProductY	Sugarland

9. Select nama and alamat of male employee with salary less than 40000

1.  $\text{Hasil} \leftarrow \pi_{\text{Nama}, \text{Alamat}} (\sigma_{\text{JenisKelamin} = 'L' \text{ AND } \text{Gaji} < 40000} (\text{Employee}))$

Nama varchar(41)	Alamat varchar(50)
John Smith	731 Fondren, Houston, TX
Ramesh Narayan	975 Fire Oak, Humble, TX
Ahmad Jabbar	980 Dallas, Houston, TX

10. Select nama and gaji of "Administration" department manager.

1.  $\text{Departement\_Manager} \leftarrow \text{Departement} \bowtie \text{Departement.NoKTP\_MGR} =$

$\text{Employee.NoKTP}$

Dname varchar(20)	Dnomor int	NoKTP_MGR varchar(10)	TglMulai_MGR date	NmDepan varchar(20)	Inisial varchar(1)	NmBelakang varchar(20)	NoKTP varchar(10)	Alamat varchar(50)	Gaji int	JenisKelamin varchar(1)	NoKTPKepala varchar(15)
Research	5	333445555	1988-05-22	Franklin	T	Wong	333445555	638 Voss, Houston, TX	40000	L	888665555
Administration	4	987654321	1995-01-01	Jennifer	S	Wallace	987654321	291 Berry, Bellaire, TX	43000	P	888665555
HeadQuarters	1	888665555	1981-06-19	James	E	Borg	888665555	450 Stone, Houston, TX	55000	L	(NULL)

2. Hasil  $\leftarrow \pi_{\text{Nama, Gaji}} (\sigma_{\text{Dname} = \text{'Administration'}} (\text{Departement\_Manager}))$

Nama varchar(41)	Gaji int
Jennifer Wallace	43000