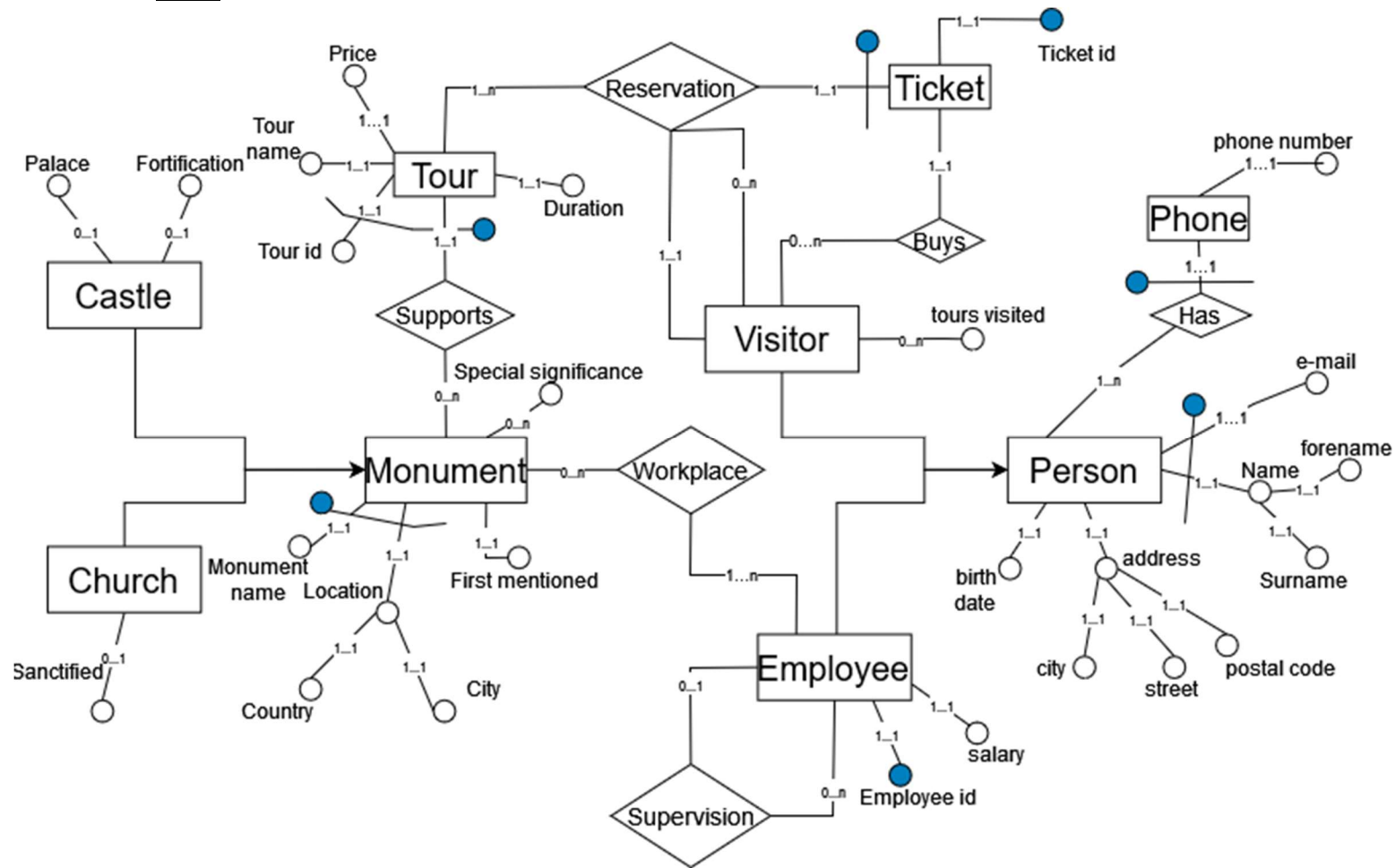


## CP 1



## CP 2

**Monument** (monument name, country, city, first mentioned, special significance)

**Castle** (monument name, country, city, palace, fortification)

FK: (monument name, country, city)  $\subseteq$  monument (monument name, country, city)

**Church** (monument name, country, city, sanctified)

FK: (monument name, country, city)  $\subseteq$  monument (monument name, country, city)

**Person** (forename, surname, e-mail, city, street, postal code, birth date)

**Phone** (forename, surname, e-mail, phone number)

FK: (forename, surname, e-mail)  $\subseteq$  person (forename, surname, e-mail)

**Employee** (employee id, forename, surname, e-mail, salary)

FK: (forename, surname, e-mail)  $\subseteq$  person (forename, surname, e-mail)

**Visitor** (forename, surname, e-mail, tours visited)

FK: (forename, surname, e-mail)  $\subseteq$  person (forename, surname, e-mail)

**Tour** (tour id, monument name, country, city, duration, price, tour name)

FK: (Monument name, country, city)  $\subseteq$  monument (Monument name, country, city)

**Ticket** (ticket id, tour id)

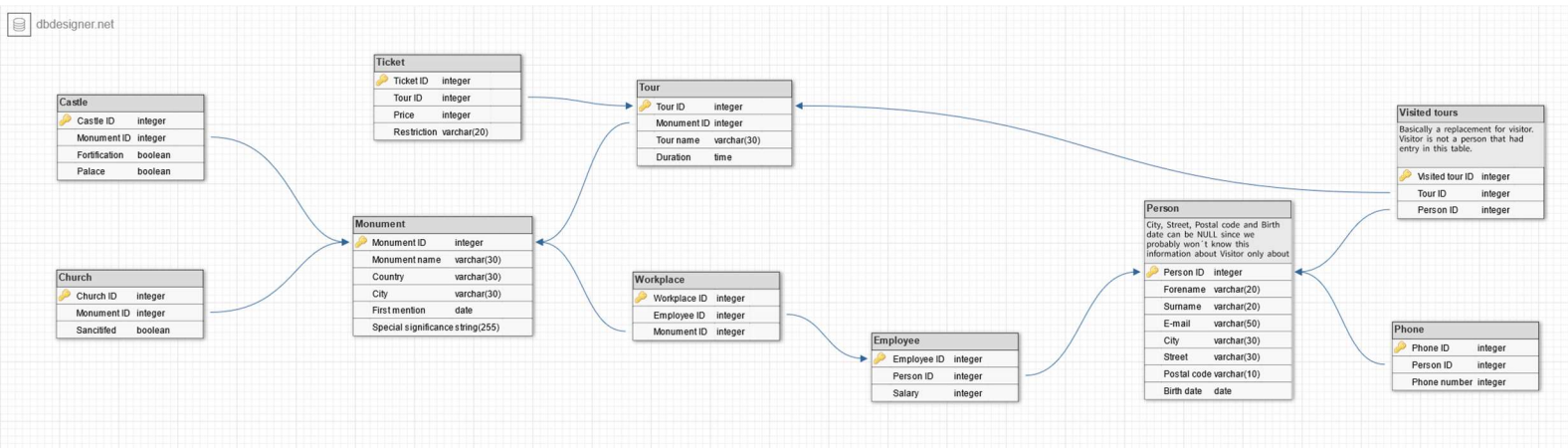
FK: (tour id)  $\subseteq$  tour (tour id)

**Workplace** (employee id, monument name, country, city)

FK: (employee id)  $\subseteq$  employee (employee id)

FK: (monument name, country, city)  $\subseteq$  monument (monument name, country, city)

## CP 3



SQL used to generate tables:

```

CREATE TABLE "Monument" (
    "Monument ID" SERIAL NOT NULL,
    "Monument name" VARCHAR(100) NOT NULL,
    "Country" VARCHAR(30) NOT NULL,
    "City" VARCHAR(30) NOT NULL,
    "First mention" DATE,
    "Special significance" VARCHAR(255),
    CONSTRAINT "Monument_pk" PRIMARY KEY ("Monument ID")
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Person" (
    "Person ID" SERIAL NOT NULL,
    "Forename" VARCHAR(20) NOT NULL,
    "Surname" VARCHAR(20) NOT NULL,
    "E-mail" varchar(50) NOT NULL,
    "City" VARCHAR(50),
    "Street" VARCHAR(50),
    "Postal code" VARCHAR(10),
    "Birth date" DATE CHECK ("Birth date" > '1900-12-31'),
    CONSTRAINT "Person_pk" PRIMARY KEY ("Person ID")
) WITH (
    OIDS=FALSE
  
```

```

);

CREATE TABLE "Tour" (
    "Tour ID" SERIAL NOT NULL,
    "Monument ID" INTEGER NOT NULL,
    "Tour name" VARCHAR(100) NOT NULL,
    "Duration" TIME,
    CONSTRAINT "Tour_pk" PRIMARY KEY ("Tour ID"),
    CONSTRAINT "Tour_fk0" FOREIGN KEY ("Monument ID")
REFERENCES "Monument"("Monument ID")
                                ON DELETE SET NULL
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Ticket" (
    "Ticket ID" SERIAL NOT NULL,
    "Tour ID" INTEGER NOT NULL,
    "Price" INTEGER,
    "Restriction" VARCHAR(50),
    CONSTRAINT "Ticket_pk" PRIMARY KEY ("Ticket ID"),
    CONSTRAINT "Ticket_fk0" FOREIGN KEY ("Tour ID")
REFERENCES "Tour"("Tour ID")
                                ON DELETE SET NULL
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Castle" (
    "Castle ID" SERIAL NOT NULL,
    "Monument ID" INTEGER NOT NULL,
    "Fortification" BOOLEAN NOT NULL,
    "Palace" BOOLEAN NOT NULL,
    CONSTRAINT "Castle_pk" PRIMARY KEY ("Castle ID"),
    CONSTRAINT "Castle_fk0" FOREIGN KEY ("Monument ID")
REFERENCES "Monument"("Monument ID")
                                ON DELETE CASCADE
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Church" (
    "Church ID" SERIAL NOT NULL,
    "Monument ID" INTEGER NOT NULL,
    "Sanctified" BOOLEAN NOT NULL,
    CONSTRAINT "Church_pk" PRIMARY KEY ("Church ID"),
    CONSTRAINT "Church_fk0" FOREIGN KEY ("Monument ID")
REFERENCES "Monument"("Monument ID")

```

```

                                ON DELETE CASCADE
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Phone" (
    "Phone ID" SERIAL NOT NULL,
    "Person ID" INTEGER NOT NULL,
    "Phone number" INTEGER NOT NULL UNIQUE CHECK ("Phone
number" <= 999999999),
    CONSTRAINT "Phone_pk" PRIMARY KEY ("Phone ID"),
    CONSTRAINT "Phone_fk0" FOREIGN KEY ("Person ID")
REFERENCES "Person" ("Person ID")
                                ON DELETE SET NULL
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Employee" (
    "Employee ID" SERIAL NOT NULL,
    "Person ID" INTEGER NOT NULL,
    "Salary" INTEGER NOT NULL,
    CONSTRAINT "Employee_pk" PRIMARY KEY ("Employee ID"),
    CONSTRAINT "Employee_fk0" FOREIGN KEY ("Person ID")
REFERENCES "Person" ("Person ID")
                                ON DELETE SET NULL
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

CREATE TABLE "Workplace" (
    "Workplace ID" SERIAL NOT NULL,
    "Employee ID" INTEGER NOT NULL,
    "Monument ID" INTEGER NOT NULL,
    CONSTRAINT "Workplace_pk" PRIMARY KEY ("Workplace
ID"),
    CONSTRAINT "Workplace_fk0" FOREIGN KEY ("Employee ID")
REFERENCES "Employee" ("Employee ID")
                                ON DELETE RESTRICT
                                ON UPDATE CASCADE,
    CONSTRAINT "Workplace_fk1" FOREIGN KEY ("Monument ID")
REFERENCES "Monument" ("Monument ID")
                                ON DELETE RESTRICT
                                ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);

```

```
CREATE TABLE "Visited tours" (
    "Visited tour ID" SERIAL NOT NULL,
    "Tour ID" INTEGER NOT NULL,
    "Person ID" INTEGER NOT NULL,
    CONSTRAINT "Visited tours_pk" PRIMARY KEY ("Visited tour
ID"),
    CONSTRAINT "Visited tours_fk0" FOREIGN KEY ("Tour ID")
REFERENCES "Tour"("Tour ID")
ON DELETE CASCADE
ON UPDATE CASCADE,
    CONSTRAINT "Visited tours_fk1" FOREIGN KEY ("Person ID")
REFERENCES "Person"("Person ID")
ON DELETE CASCADE
ON UPDATE CASCADE
) WITH (
    OIDS=FALSE
);
```

## Queries:

```
/*Selects Monument name, First mention and Special
significance of Monuments that are not in Prague*/
SELECT "Monument name", "First mention", "Special
significance" from "Monument" WHERE ("City" != 'Praha');
```

"Monument name"	"First mention"	"Special significance"
1. Kostel Nanebevzetí Panny Marie a svatého Jana Křtitele	1142-01-01	Rebuilt by Jan Santini Aichel
2. Karlštejn	1348-06-10	Protected remains of saints and Crowning Jewels of Holy roman empire
3. Kašperk	1361-01-01	Protected Bohemia's borders
4. Švihov	1375-01-01	<null>
5. Krakovec	1381-01-01	The movie "At žijí duchové" took place here
6. Houska	1280-01-01	Is famous for paranormal activities
7. Zámek Litomyšl	1568-01-01	Is part of World Heritage (UNESCO)
8. Chrám svatě Barbory	1388-01-01	Is part of World Heritage (UNESCO)
9. Kostel Nanebevzetí Panny Marie (Neratov v Orlických horách)	1693-01-01	<null>
10. Opočno	1394-01-01	<null>
11. Hrad Zvíkov	1234-01-01	<null>
12. Hrad Štramberk	1200-01-01	<null>
13. Hrad Svojanov	1224-01-01	<null>
14. Kostel Jména Panny Marie	1718-01-01	Built by Jan Santini Aichel

```
/*Counts all tours that are on monuments in Kutná Hora*/
SELECT COUNT("Tour"."Monument ID") FROM "Tour" INNER JOIN
"Monument" ON "Tour"."Monument ID" = "Monument"."Monument ID"
AND ("City" = 'Kutná Hora');
```

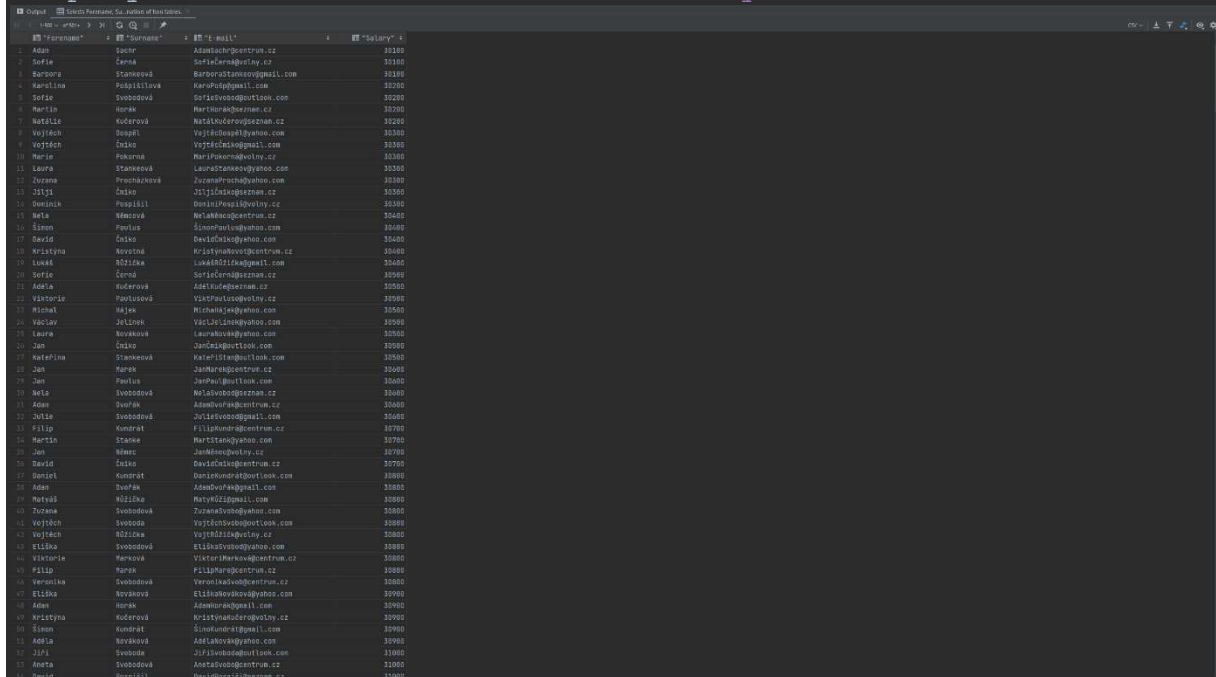
count
1

```
/*Counts all tours that took place on monuments in Prague*/
SELECT COUNT("Visited tours"."Person ID") FROM "Visited tours"
INNER JOIN "Tour" ON "Visited tours"."Tour ID" = "Tour"."Tour
ID" INNER JOIN "Monument" ON "Tour"."Monument ID" =
"Monument"."Monument ID" AND ("City" = 'Praha');
```

count
2093

```
/*Selects Forename, Surname, E-mail and Salary for all employees and orders the by salary in ascending order. Combination of two tables.*/
```

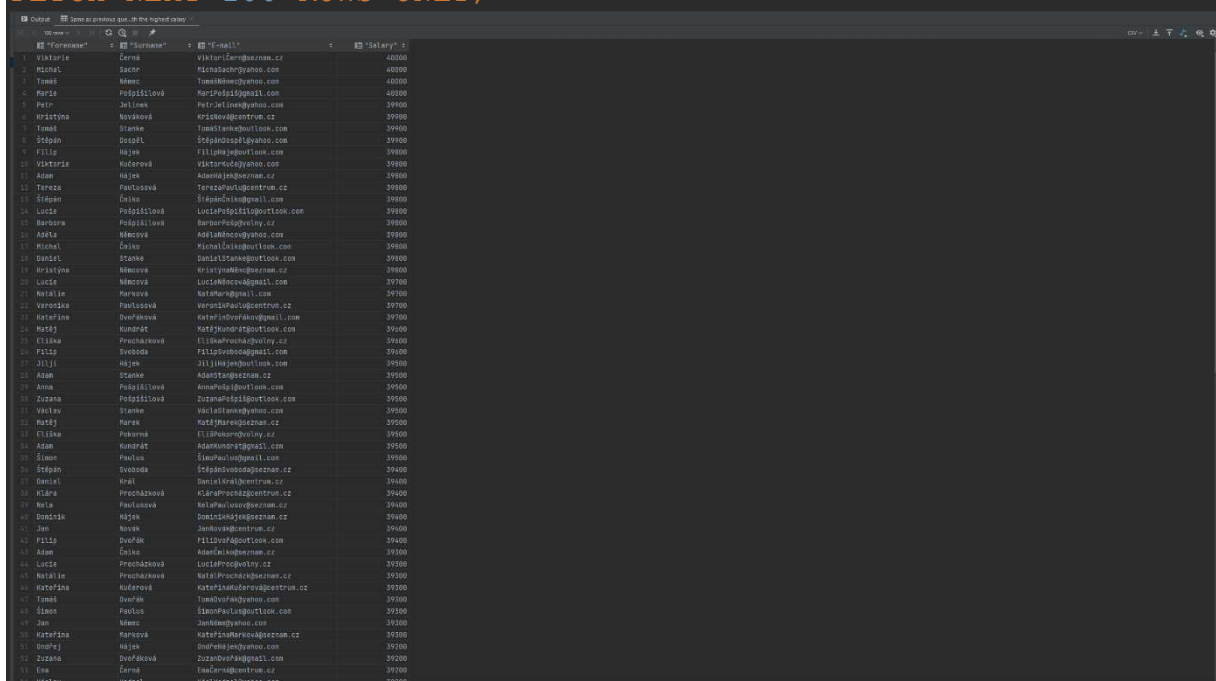
```
SELECT "Forename", "Surname", "E-mail", "Salary" FROM "Person"
INNER JOIN "Employee" ON "Person"."Person ID" =
"Employee"."Person ID" ORDER BY "Salary";
```



	Forename	Surname	E-mail	Salary
1	Adam	Sachr	AdamSachr@centrum.cz	30100
2	Soňa	Černá	SoňaCern@volny.cz	30100
3	Barbora	Stanková	BarboraStankova@gmail.com	30100
4	Karelina	Polgáillová	KarelPolg@gmail.com	30200
5	Soňa	Švobodová	SoňaŠvobodova@seznam.cz	30200
6	Martin	Hájek	MartinHajek@seznam.cz	30200
7	Natalie	Kučerová	NatalieKuc@volny.cz	30200
8	Vojtěch	Štěpěl	VojtechStepel@yahoo.com	30300
9	Vojtěch	Čadež	VojtechCadez@gmail.com	30300
10	Marie	Pokorná	MariePokorna@volny.cz	30300
11	Laura	Stanková	LauraStankova@yahoo.com	30300
12	Zuzana	Procházková	ZuzanaProchazkova@gmail.com	30300
13	Jiří	Čadež	JiriCadez@seznam.cz	30300
14	Štěpán	Polgáillov	StepanPolg@volny.cz	30300
15	Helena	Měncová	HelenaMencova@centrum.cz	30400
16	Šimon	Paulus	SimonPaulus@yahoo.com	30400
17	David	Čadež	DavidCadez@yahoo.com	30400
18	Kristýna	Nevostná	KristynaNevostna@centrum.cz	30400
19	Luďka	Řířáková	LudkaRirakova@gmail.com	30400
20	Soňa	Černá	SoňaCern@seznam.cz	30400
21	Adela	Kučerová	AdelaKuc@seznam.cz	30500
22	Viktorie	Paulusová	ViktorPaulusova@volny.cz	30500
23	Michal	Hájek	MichalHajek@yahoo.com	30500
24	Marie	Jelínková	MarieJelinkova@gmail.com	30500
25	Laura	Nováková	LauraNovakova@gmail.com	30500
26	Jan	Čadež	JanCadez@volny.cz	30500
27	Kateřina	Švobodová	KateřinaŠvobodova@centrum.cz	30500
28	Jan	Novák	JanNovak@centrum.cz	30500
29	Jan	Paulus	JanPaulus@volny.cz	30600
30	Helena	Švobodová	HelenaŠvobodova@seznam.cz	30600
31	Adam	Štěpěl	AdamStepel@centrum.cz	30600
32	Soňa	Švobodová	SoňaŠvobodova@gmail.com	30600
33	Filip	Kundrát	FilipKundrat@centrum.cz	30700
34	Martin	Stank	MartinStank@yahoo.com	30700
35	Jan	Hájek	JanHajek@volny.cz	30700
36	David	Čadež	DavidCadez@centrum.cz	30700
37	Denise	Kundrát	DeniseKundrat@volny.cz	30800
38	Adam	Štěpěl	AdamStepel@gmail.com	30800
39	Marie	Řířáková	MarieRirakova@gmail.com	30800
40	Zuzana	Švobodová	ZuzanaŠvobodova@gmail.com	30800
41	Vojtěch	Švobodová	VojtechŠvobodova@gmail.com	30800
42	Vojtěch	Řířáková	VojtechRirakova@volny.cz	30800
43	Eliska	Švobodová	EliskaŠvobodova@yahoo.com	30800
44	Viktorie	Hájeková	ViktorieHajekova@centrum.cz	30800
45	Filip	Hájek	FilipHajek@centrum.cz	30800
46	Veronika	Švobodová	VeronikaŠvobodova@centrum.cz	30800
47	Eliska	Nováková	EliskaNovakova@yahoo.com	30900
48	Adam	Hájek	AdamHajek@gmail.com	30900
49	Kristýna	Kučerová	KristynaKuc@volny.cz	30900
50	Šimon	Kundrát	SimonKundrat@gmail.com	30900
51	Adela	Nováková	AdelaNovakova@gmail.com	30900
52	Jiří	Švobodová	JiriŠvobodova@volny.cz	30900
53	Aneta	Švobodová	AnetaŠvobodova@centrum.cz	31000
54	David	Procházka	DavidProchazka@seznam.cz	31000

```
/*Same as previous query but shows 100 employees with the highest salary*/
```

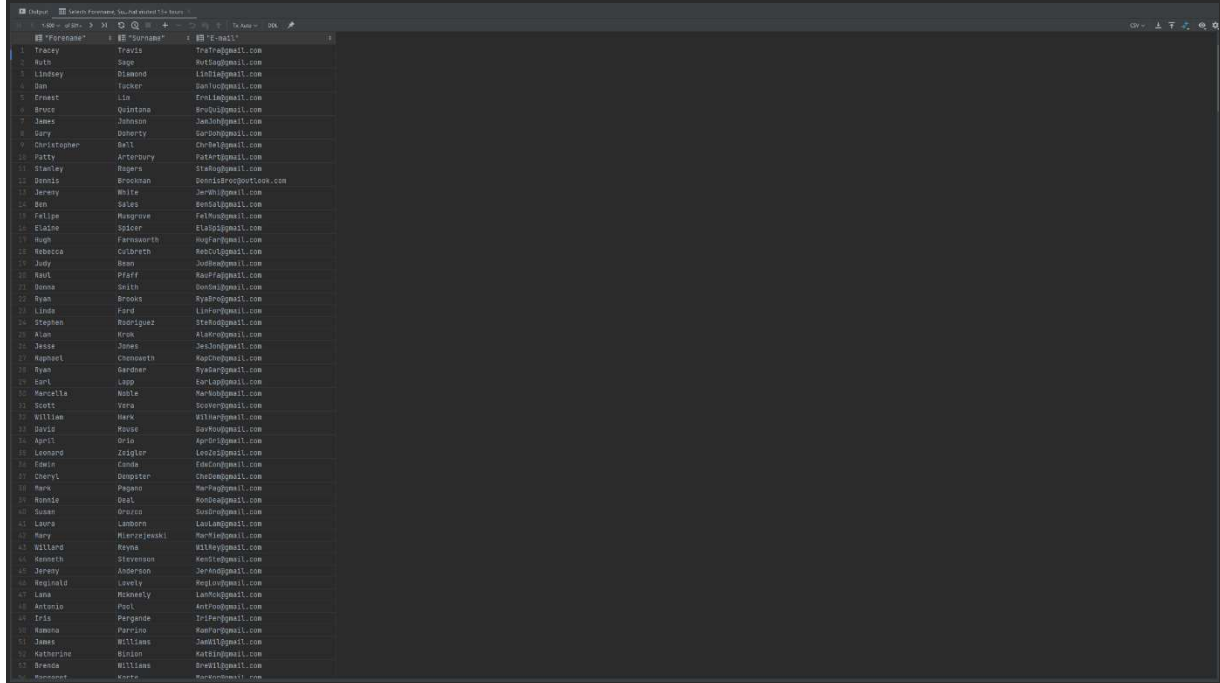
```
SELECT "Forename", "Surname", "E-mail", "Salary" FROM "Person"
INNER JOIN "Employee" ON "Person"."Person ID" =
"Employee"."Person ID" ORDER BY "Salary" DESC OFFSET 0 ROWS
FETCH NEXT 100 ROWS ONLY;
```



	Forename	Surname	E-mail	Salary
1	Viktorie	Černá	ViktorieCern@seznam.cz	40000
2	Michal	Sachr	MichaSachr@yahoo.com	40000
3	Tomáš	Hájek	Tomashajek@volny.cz	40000
4	Marie	Polgáillová	MariePolg@gmail.com	40000
5	Petr	Jelínková	PetrJelinkova@yahoo.com	39900
6	Kristýna	Nevostná	KristynaNevostna@centrum.cz	39900
7	Tomáš	Stank	TomashStank@volny.cz	39900
8	Štěpán	Štěpěl	StepanStepel@yahoo.com	39900
9	Filip	Hájek	FilipHajek@volny.cz	39900
10	Viktorie	Kučerová	ViktorieKuc@volny.cz	39900
11	Adam	Hájek	AdamHajek@seznam.cz	39900
12	Tereza	Paulusová	TerezaPaulusova@centrum.cz	39900
13	Štěpán	Čadež	StepanCadez@gmail.com	39900
14	Lucie	Polgáillov	LuciePolg@volny.cz	39900
15	Barbora	Polgáillová	BarboraPolg@volny.cz	39900
16	Adela	Měncová	AdelaMencova@yahoo.com	39900
17	Michal	Čadež	MichalCadez@volny.cz	39900
18	Denise	Stank	DeniseStank@volny.cz	39900
19	Kristýna	Měncová	KristynaMencova@seznam.cz	39900
20	Lucie	Měncová	LucieMencova@gmail.com	39700
21	Natalie	Hájeková	NatalieHajekova@gmail.com	39700
22	Veronika	Paulusová	VeronikaPaulusova@centrum.cz	39700
23	Kateřina	Švobodová	KateřinaŠvobodova@gmail.com	39700
24	Matěj	Kundrát	MatějKundrat@volny.cz	39600
25	Eliska	Procházková	EliskaProchazkova@volny.cz	39600
26	Filip	Švobodová	FilipŠvobodova@gmail.com	39600
27	Jiří	Hájek	JiriHajek@volny.cz	39500
28	Adam	Stank	AdamStank@seznam.cz	39500
29	Ana	Polgáillov	AnaPolg@volny.cz	39500
30	Zuzana	Polgáillová	ZuzanaPolg@volny.cz	39500
31	Václav	Stank	VaclavStank@yahoo.com	39500
32	Matěj	Hájek	MatějHajek@seznam.cz	39500
33	Eliska	Hájeková	EliskaHajekova@volny.cz	39500
34	Adam	Kundrát	AdamKundrat@gmail.com	39500
35	Šimon	Paulus	SimonPaulus@gmail.com	39500
36	Štěpán	Švobodová	StepanŠvobodova@centrum.cz	39400
37	Denise	Kapal	DeniseKapal@centrum.cz	39400
38	Klára	Procházková	KlaraProchazkova@centrum.cz	39400
39	Helena	Paulusová	HelenaPaulusova@seznam.cz	39400
40	Domitř	Hájek	DomitriHajek@centrum.cz	39400
41	Jan	Novák	JanNovak@centrum.cz	39400
42	Filip	Čadež	FilipCadez@volny.cz	39400
43	Adam	Čadež	AdamCadez@seznam.cz	39300
44	Lucie	Procházková	LucieProchazkova@volny.cz	39300
45	Natalie	Procházková	NatalieProchazkova@seznam.cz	39300
46	Kateřina	Kučerová	KateřinaKuc@volny.cz	39300
47	Tomáš	Štěpěl	TomashStepel@gmail.com	39300
48	Šimon	Paulus	SimonPaulus@volny.cz	39300
49	Jan	Hájek	JanHajek@yahoo.com	39300
50	Kateřina	Hájeková	KateřinaHajekova@seznam.cz	39300
51	Denise	Hájek	DeniseHajek@gmail.com	39200
52	Zuzana	Švobodová	ZuzanaŠvobodova@gmail.com	39200
53	Helena	Čadež	HelenaCadez@centrum.cz	39200
54	David	Kundrát	DavidKundrat@volny.cz	39200

```
/*Selects Forename, Surname and E-mail of people that visited 13+ tours*/
```

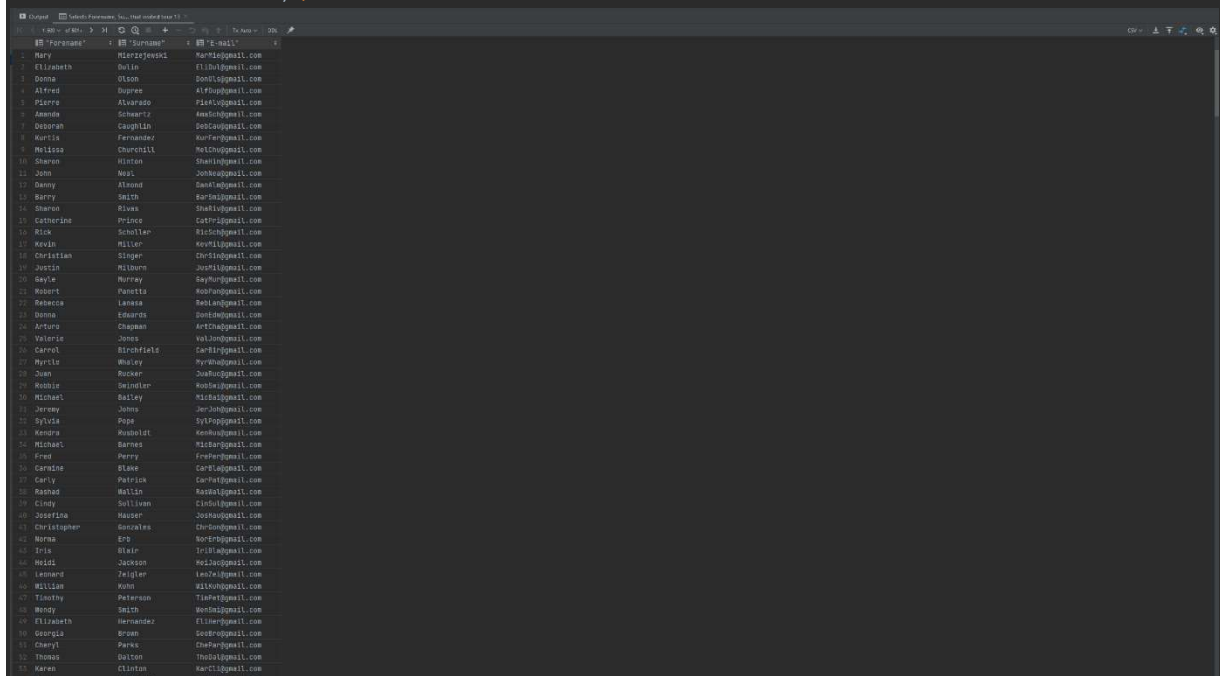
```
SELECT "Forename", "Surname", "E-mail" FROM "Person" INNER  
JOIN "Visited tours" ON  
"Person"."Person ID" = "Visited tours"."Person ID" GROUP BY  
"Person"."Person ID", "Forename", "Surname", "E-mail" HAVING  
COUNT(*) >= 13;
```



	Forename	Surname	E-mail
1	Tracey	Travis	TravisT@igmail.com
2	Aub	Sage	AubS@igmail.com
3	Lindsey	Blawie	LindseyB@igmail.com
4	Sam	Tucker	SamT@igmail.com
5	Ernest	Lin	ErnestL@igmail.com
6	Bruce	Quintana	BruceQ@igmail.com
7	James	Jensen	JamesJ@igmail.com
8	Sary	Doherty	SaryD@igmail.com
9	Christopher	Bell	ChrisB@igmail.com
10	Patty	Antebury	PattyA@igmail.com
11	Stanley	Rogers	StanR@igmail.com
12	Dennis	Brookman	DennisB@igmail.com
13	Jeremy	White	JeremyW@igmail.com
14	Don	Siles	DonS@igmail.com
15	Philip	Wapner	PhilipW@igmail.com
16	Elaine	Spicer	ElaineS@igmail.com
17	Hugh	Forsworth	HughF@igmail.com
18	Rebecca	Clemens	RebeccaC@igmail.com
19	July	Benn	JulyB@igmail.com
20	Raul	Pfaff	RaulP@igmail.com
21	Donna	Smith	DonnaS@igmail.com
22	Ryan	Sproun	RyanS@igmail.com
23	Linda	Ford	LindaF@igmail.com
24	Stephen	Rodriguez	StephenR@igmail.com
25	Alan	Musk	AlanM@igmail.com
26	Jackie	Jones	JackieJ@igmail.com
27	Agnes	Chenault	AgnesC@igmail.com
28	Ryan	Gardner	RyanG@igmail.com
29	Sari	Lupp	SariL@igmail.com
30	Marcilla	Holte	MarcillaH@igmail.com
31	Scott	Vera	ScottV@igmail.com
32	William	Herk	WilliamH@igmail.com
33	Javis	Mosse	JavisM@igmail.com
34	Annell	Ors	AnnellO@igmail.com
35	Leonard	Ziegler	LeonardZ@igmail.com
36	Edwin	Canda	EdwinC@igmail.com
37	Cheryl	Dempster	CherylD@igmail.com
38	Mae	Agnes	MaeA@igmail.com
39	Nannie	Deal	NannieD@igmail.com
40	Susan	Orsica	SusanO@igmail.com
41	Laura	Lemore	LauraL@igmail.com
42	Mary	Mierzejewski	MaryM@igmail.com
43	Willard	Reyna	WillardR@igmail.com
44	Kenneth	Stevens	KennethS@igmail.com
45	Jeremy	Anderson	JeremyA@igmail.com
46	Reginald	Lowely	ReginaldL@igmail.com
47	Lana	McKenney	LanaM@igmail.com
48	Antonio	Post	AntonioP@igmail.com
49	Iris	Pargande	IrisP@igmail.com
50	Samone	Perrino	SamoneP@igmail.com
51	James	Williams	JamesW@igmail.com
52	Katherine	Burton	KatherineB@igmail.com
53	Branda	Williams	BrandaW@igmail.com
54	Marionnet	Korte	MarionnetK@igmail.com

```
/*Selects Forename, Surname and E-mail of people that visited  
tour 13*/
```

```
SELECT "Forename", "Surname", "E-mail" FROM "Person" WHERE  
"Person ID" IN (SELECT "Person ID" FROM "Visited tours" WHERE  
"Tour ID" = 13);
```



	Forename	Surname	E-mail
1	Mary	Mierzejewski	MaryM@igmail.com
2	Elizabeth	Dulin	ElizabethD@igmail.com
3	Donna	Olson	DonnaO@igmail.com
4	Alfred	Dwyer	AlfredD@igmail.com
5	Pierre	Alvarado	PierreA@igmail.com
6	Amelia	Schwartz	AmeliaS@igmail.com
7	Deborah	Coughlin	DeborahC@igmail.com
8	Kurtis	Fernandez	KurtisF@igmail.com
9	Malissa	Churchill	MalissaC@igmail.com
10	Sharon	Hinton	SharonH@igmail.com
11	John	Masi	JohnM@igmail.com
12	Danny	Almon	DannyA@igmail.com
13	Barry	Smith	BarryS@igmail.com
14	Sharon	Rivers	SharonR@igmail.com
15	Catherine	Prince	CatherineP@igmail.com
16	Rita	Schaller	RitaS@igmail.com
17	Kevin	Miller	KevinM@igmail.com
18	Christian	Singer	ChristianS@igmail.com
19	Justin	Almon	JustinA@igmail.com
20	Gayle	Murray	GayleM@igmail.com
21	Robert	Panetta	RobertP@igmail.com
22	Rebecca	Lance	RebeccaL@igmail.com
23	Dana	Thurms	DanaT@igmail.com
24	Arturo	Chapman	ArturoC@igmail.com
25	Valerie	Jones	ValerieJ@igmail.com
26	Carrel	Birchfield	CarrelB@igmail.com
27	Marla	Whaley	MarlaW@igmail.com
28	Juan	Rucker	JuanR@igmail.com
29	Karin	Swindler	KarinS@igmail.com
30	Michael	Bailey	MichaelB@igmail.com
31	Henry	Jones	HenryJ@igmail.com
32	Sylvia	Pope	SylviaP@igmail.com
33	Kendra	Musold	KendraM@igmail.com
34	Michael	Barnes	MichaelB@igmail.com
35	Fred	Perry	FredP@igmail.com
36	Caroline	Blake	CarolineB@igmail.com
37	Carly	Patrick	CarlyP@igmail.com
38	Rahad	Wells	RahadW@igmail.com
39	Cindy	Sullivan	CindyS@igmail.com
40	Josephine	Hauer	JosephineH@igmail.com
41	Christopher	Harries	ChristopherH@igmail.com
42	Nana	EP	NanaE@igmail.com
43	Iris	Blair	IrisB@igmail.com
44	Wendi	Jackson	WendiJ@igmail.com
45	Leonard	Ziegler	LeonardZ@igmail.com
46	Willie	Kahn	WillieK@igmail.com
47	Timothy	Peterson	TimothyP@igmail.com
48	Wendy	Smith	WendyS@igmail.com
49	Elizabeth	Hermes	ElizabethH@igmail.com
50	Georgia	Wynn	GeorgiaW@igmail.com
51	Cheryl	Parks	CherylP@igmail.com
52	Thomas	Dutton	ThomasD@igmail.com
53	Karen	Clinch	KarenC@igmail.com
54	Kari	Bruchman	KariB@igmail.com



```
/*Selects Forename, Surname and E-mail of people that visited
between 13 and 16 tours*/
```

```
SELECT "Forename", "Surname", "E-mail" FROM "Person" INNER
JOIN "Visited tours" ON
"Person"."Person ID" = "Visited tours"."Person ID" GROUP BY
"Person"."Person ID", "Forename", "Surname", "E-mail" HAVING
COUNT(*) >= 13
EXCEPT
SELECT "Forename", "Surname", "E-mail" FROM "Person" INNER
JOIN "Visited tours" ON
"Person"."Person ID" = "Visited tours"."Person ID" GROUP BY
"Person"."Person ID", "Forename", "Surname", "E-mail" HAVING
COUNT(*) >= 17;
```

Forename	Surname	E-mail
Robert	Priest	RaPriest@gmail.com
Christian	Singer	ChrisSinger@gmail.com
Joshua	Kucenski	JoshKucenski@gmail.com
David	Parent	DaveParent@gmail.com
Morris	Bagley	MorBagley@gmail.com
Tim	Smith	TimSmith@gmail.com
Bernice	Brown	BerBrown@gmail.com
Thomas	Wilson	ThomWilson@gmail.com
Edw	Beer	EdwBeer@gmail.com
Med	Solomon	MedSolomon@gmail.com
Vicky	Briggett	VickyBriggett@gmail.com
Cassandra	Hill	CassHill@gmail.com
Francis	Delvick	FrankDelvick@gmail.com
Roger	Greene	RogGreene@gmail.com
Grace	Luna	GraceLuna@gmail.com
Michael	Rodriguez	MikeRodriguez@gmail.com
Rory	Reisner	RoryReisner@gmail.com
Suzana	Rensch	SuzRensch@gmail.com
Dale	Washington	DaleWashington@gmail.com
Donna	Smith	DonnaSmith@gmail.com
Clay	Wesley	ClayWesley@gmail.com
Ananda	Schwarz	AnandaSchwarz@gmail.com
April	Johnson	AprilJohnson@gmail.com
Christopher	Renzales	ChrisRenzales@gmail.com
Clawdette	Parwell	ClawdetteParwell@gmail.com
William	Lewis	WillLewis@gmail.com
Novella	Stevens	NovellaStevens@gmail.com
Bonita	Carpenter	BonitaCarpenter@gmail.com
Ishty	Der	IshtyDer@gmail.com
Courtney	Frazier	CourtneyFrazier@gmail.com
Robert	Lewis	RobLewis@gmail.com
Boris	Johnson	BorisJohnson@gmail.com
Opal	Hill	OpalHill@gmail.com
Earl	Peterson	EarlPeterson@gmail.com
Denetra	McGow	DenetraMcGow@gmail.com
William	Hart	WillHart@gmail.com
Harris	Stacy	HarStacy@gmail.com
Stanley	Jacko	StanJacko@gmail.com
Jason	Crut	JasonCrut@gmail.com
Joyce	Floyd	JoyceFloyd@gmail.com
Flaise	Logan	FlaiseLogan@gmail.com
Richard	Hays	RichHays@gmail.com
Deanna	Murphy	DeannaMurphy@gmail.com
Brandon	Maria	BrandonMaria@gmail.com
Idella	Hanks	IdellaHanks@gmail.com
Lloyd	Hill	LloydHill@gmail.com
Pauline	Baron	PaulineBaron@gmail.com
Kathryn	Edwards	KathyEdwards@gmail.com
Sarah	George	SarahGeorge@gmail.com
Lawrence	Carter	LawCarter@gmail.com
Gilbert	Trenton	GilbertTrenton@gmail.com
Benjamin	Frost	BenFrost@gmail.com
Raymond	Hagan	RayHagan@gmail.com
Tamara	Lawrence	TamaraLawrence@gmail.com



```

/*Selects Forename, Surname, E-mail and Tour name for each
person aka. we see multiple entries for each person with
different tour names*/
SELECT "Forename", "Surname", "E-mail", "Tour name" FROM
"Person"
FULL OUTER JOIN "Visited tours" ON "Person"."Person ID" =
"Visited tours"."Person ID"
FULL OUTER JOIN "Tour" ON "Visited tours"."Tour ID" =
"Tour"."Tour ID";

```

Person ID	Forename	Surname	E-mail	Tour name
1	Patricia	Leonard	Patleogmail.com	Sesler Area (Cathedral + Treasury)
2	Patricia	Leonard	Patleogmail.com	Sesler Area + St. Barbara's Cathedral
3	Patricia	Leonard	Patleogmail.com	Imperial Residence of Charles IV (basic tour)
4	Patricia	Leonard	Patleogmail.com	Karlštejn Castle Chapels (exclusive tour)
5	Patricia	Leonard	Patleogmail.com	The Great Tower View
6	Patricia	Leonard	Patleogmail.com	Living in the castle
7	Patricia	Leonard	Patleogmail.com	Building of the castle
8	Patricia	Leonard	Patleogmail.com	The Castle - Life in late medieval castle (basic tour)
9	Patricia	Leonard	Patleogmail.com	The kitchen and castle background
10	Patricia	Leonard	Patleogmail.com	The Tower - from ruin to cultural heritage
11	Mary	Mierzejewski	MarMieogmail.com	Sesler Area (Cathedral + Treasury)
12	Mary	Mierzejewski	MarMieogmail.com	Sesler Area + St. Barbara's Cathedral
13	Mary	Mierzejewski	MarMieogmail.com	Imperial Residence of Charles IV (basic tour)
14	Mary	Mierzejewski	MarMieogmail.com	Karlštejn Castle Chapels (exclusive tour)
15	Mary	Mierzejewski	MarMieogmail.com	The Great Tower View
16	Mary	Mierzejewski	MarMieogmail.com	Living in the castle
17	Mary	Mierzejewski	MarMieogmail.com	Building of the castle
18	Mary	Mierzejewski	MarMieogmail.com	The Castle - Life in late medieval castle (basic tour)
19	Mary	Mierzejewski	MarMieogmail.com	The kitchen and castle background
20	Mary	Mierzejewski	MarMieogmail.com	The Tower - from ruin to cultural heritage
21	Mary	Mierzejewski	MarMieogmail.com	The Castle - Life in late medieval castle (basic tour)
22	Mary	Mierzejewski	MarMieogmail.com	Castle without barriers
23	Mary	Mierzejewski	MarMieogmail.com	The secret of Cinderella's shoe
24	Mary	Mierzejewski	MarMieogmail.com	Tour of the church
25	Mary	Mierzejewski	MarMieogmail.com	Tour of the cathedral
26	Mary	Mierzejewski	MarMieogmail.com	Castle Královce (basic tour)
27	Mary	Mierzejewski	MarMieogmail.com	Tour of the castle
28	Charlotte	Fuhrman	ChaFuogmail.com	Sesler Area (Cathedral + Treasury)
29	Charlotte	Fuhrman	ChaFuogmail.com	Sesler Area + St. Barbara's Cathedral
30	Charlotte	Fuhrman	ChaFuogmail.com	Imperial Residence of Charles IV (basic tour)
31	Charlotte	Fuhrman	ChaFuogmail.com	Karlštejn Castle Chapels (exclusive tour)
32	Charlotte	Fuhrman	ChaFuogmail.com	The Great Tower View
33	Charlotte	Fuhrman	ChaFuogmail.com	Living in the castle
34	Charlotte	Fuhrman	ChaFuogmail.com	Building of the castle
35	Elizabeth	Dulin	ELiDuogmail.com	Sesler Area (Cathedral + Treasury)
36	Elizabeth	Dulin	ELiDuogmail.com	Sesler Area + St. Barbara's Cathedral
37	Elizabeth	Dulin	ELiDuogmail.com	Imperial Residence of Charles IV (basic tour)
38	Elizabeth	Dulin	ELiDuogmail.com	Karlštejn Castle Chapels (exclusive tour)
39	Elizabeth	Dulin	ELiDuogmail.com	The Great Tower View
40	Elizabeth	Dulin	ELiDuogmail.com	Living in the castle
41	Elizabeth	Dulin	ELiDuogmail.com	Building of the castle
42	Elizabeth	Dulin	ELiDuogmail.com	The Castle - Life in late medieval castle (basic tour)
43	Elizabeth	Dulin	ELiDuogmail.com	The kitchen and castle background
44	Elizabeth	Dulin	ELiDuogmail.com	The Tower - from ruin to cultural heritage
45	Elizabeth	Dulin	ELiDuogmail.com	The Castle - Life in late medieval castle (basic tour)
46	Elizabeth	Dulin	ELiDuogmail.com	Castle without barriers
47	Elizabeth	Dulin	ELiDuogmail.com	The secret of Cinderella's shoe
48	Elizabeth	Dulin	ELiDuogmail.com	Tour of the church
49	Elizabeth	Dulin	ELiDuogmail.com	Tour of the cathedral
50	Elizabeth	Dulin	ELiDuogmail.com	Castle Královce (basic tour)
51	Elizabeth	Dulin	ELiDuogmail.com	Tour of the castle
52	Elizabeth	Dulin	ELiDuogmail.com	Castle during the rule of Valdesin (basic tour)
53	Elizabeth	Dulin	ELiDuogmail.com	Castle during the rule of Thurn-Taxis
54	Elizabeth	Dulin	ELiDuogmail.com	The Crown of the castle (basic tour)

```

/*Selects all information stored in Person table for people
that are also Employees*/
SELECT * FROM "Person" WHERE "Person ID" IN (SELECT "Person
ID" FROM "Employee")

```

Person ID	Forename	Surname	E-mail	City	Street	Postal code	Birth date
1	4003	Michal	Micha	Vltava	Mirova	74001	2000-01-01
2	4004	Michal	Micha	Vltava	Mirova	74001	2000-01-01
3	4005	Michal	Micha	Vltava	Mirova	74001	2000-01-01
4	4006	Michal	Micha	Vltava	Mirova	74001	2000-01-01
5	4007	Michal	Micha	Vltava	Mirova	74001	2000-01-01
6	4008	Michal	Micha	Vltava	Mirova	74001	2000-01-01
7	4009	Michal	Micha	Vltava	Mirova	74001	2000-01-01
8	4010	Michal	Micha	Vltava	Mirova	74001	2000-01-01
9	4011	Michal	Micha	Vltava	Mirova	74001	2000-01-01
10	4012	Michal	Micha	Vltava	Mirova	74001	2000-01-01
11	4013	Michal	Micha	Vltava	Mirova	74001	2000-01-01
12	4014	Michal	Micha	Vltava	Mirova	74001	2000-01-01
13	4015	Michal	Micha	Vltava	Mirova	74001	2000-01-01
14	4016	Michal	Micha	Vltava	Mirova	74001	2000-01-01
15	4017	Michal	Micha	Vltava	Mirova	74001	2000-01-01
16	4018	Michal	Micha	Vltava	Mirova	74001	2000-01-01
17	4019	Michal	Micha	Vltava	Mirova	74001	2000-01-01
18	4020	Michal	Micha	Vltava	Mirova	74001	2000-01-01
19	4021	Michal	Micha	Vltava	Mirova	74001	2000-01-01
20	4022	Michal	Micha	Vltava	Mirova	74001	2000-01-01
21	4023	Michal	Micha	Vltava	Mirova	74001	2000-01-01
22	4024	Michal	Micha	Vltava	Mirova	74001	2000-01-01
23	4025	Michal	Micha	Vltava	Mirova	74001	2000-01-01
24	4026	Michal	Micha	Vltava	Mirova	74001	2000-01-01
25	4027	Michal	Micha	Vltava	Mirova	74001	2000-01-01
26	4028	Michal	Micha	Vltava	Mirova	74001	2000-01-01
27	4029	Michal	Micha	Vltava	Mirova	74001	2000-01-01
28	4030	Michal	Micha	Vltava	Mirova	74001	2000-01-01
29	4031	Michal	Micha	Vltava	Mirova	74001	2000-01-01
30	4032	Michal	Micha	Vltava	Mirova	74001	2000-01-01
31	4033	Michal	Micha	Vltava	Mirova	74001	2000-01-01
32	4034	Michal	Micha	Vltava	Mirova	74001	2000-01-01
33	4035	Michal	Micha	Vltava	Mirova	74001	2000-01-01
34	4036	Michal	Micha	Vltava	Mirova	74001	2000-01-01
35	4037	Michal	Micha	Vltava	Mirova	74001	2000-01-01
36	4038	Michal	Micha	Vltava	Mirova	74001	2000-01-01
37	4039	Michal	Micha	Vltava	Mirova	74001	2000-01-01
38	4040	Michal	Micha	Vltava	Mirova	74001	2000-01-01
39	4041	Michal	Micha	Vltava	Mirova	74001	2000-01-01
40	4042	Michal	Micha	Vltava	Mirova	74001	2000-01-01
41	4043	Michal	Micha	Vltava	Mirova	74001	2000-01-01
42	4044	Michal	Micha	Vltava	Mirova	74001	2000-01-01
43	4045	Michal	Micha	Vltava	Mirova	74001	2000-01-01
44	4046	Michal	Micha	Vltava	Mirova	74001	2000-01-01
45	4047	Michal	Micha	Vltava	Mirova	74001	2000-01-01
46	4048	Michal	Micha	Vltava	Mirova	74001	2000-01-01
47	4049	Michal	Micha	Vltava	Mirova	74001	2000-01-01
48	4050	Michal	Micha	Vltava	Mirova	74001	2000-01-01
49	4051	Michal	Micha	Vltava	Mirova	74001	2000-01-01
50	4052	Michal	Micha	Vltava	Mirova	74001	2000-01-01
51	4053	Michal	Micha	Vltava	Mirova	74001	2000-01-01
52	4054	Michal	Micha	Vltava	Mirova	74001	2000-01-01
53	4055	Michal	Micha	Vltava	Mirova	74001	2000-01-01
54	4056	Michal	Micha	Vltava	Mirova	74001	2000-01-01
55	4057	Michal	Micha	Vltava	Mirova	74001	2000-01-01
56	4058	Michal	Micha	Vltava	Mirova	74001	2000-01-01
57	4059	Michal	Micha	Vltava	Mirova	74001	2000-01-01
58	4060	Michal	Micha	Vltava	Mirova	74001	2000-01-01
59	4061	Michal	Micha	Vltava	Mirova	74001	2000-01-01
60	4062	Michal	Micha	Vltava	Mirova	74001	2000-01-01
61	4063	Michal	Micha	Vltava	Mirova	74001	2000-01-01
62	4064	Michal	Micha	Vltava	Mirova	74001	2000-01-01
63	4065	Michal	Micha	Vltava	Mirova	74001	2000-01-01
64	4066	Michal	Micha	Vltava	Mirova	74001	2000-01-01
65	4067	Michal	Micha	Vltava	Mirova	74001	2000-01-01
66	4068	Michal	Micha	Vltava	Mirova	74001	2000-01-01
67	4069	Michal	Micha	Vltava	Mirova	74001	2000-01-01
68	4070	Michal	Micha	Vltava	Mirova	74001	2000-01-01
69	4071	Michal	Micha	Vltava	Mirova	74001	2000-01-01
70	4072	Michal	Micha	Vltava	Mirova	74001	2000-01-01
71	4073	Michal	Micha	Vltava	Mirova	74001	2000-01-01
72	4074	Michal	Micha	Vltava	Mirova	74001	2000-01-01
73	4075	Michal	Micha	Vltava	Mirova	74001	2000-01-01
74	4076	Michal	Micha	Vltava	Mirova	74001	2000-01-01
75	4077	Michal	Micha	Vltava	Mirova	74001	2000-01-01
76	4078	Michal	Micha	Vltava	Mirova	74001	2000-01-01
77	4079	Michal	Micha	Vltava	Mirova	74001	2000-01-01
78	4080	Michal	Micha	Vltava	Mirova	74001	2000-01-01
79	4081	Michal	Micha	Vltava	Mirova	74001	2000-01-01
80	4082	Michal	Micha	Vltava	Mirova	74001	2000-01-01
81	4083	Michal	Micha	Vltava	Mirova	74001	2000-01-01
82	4084	Michal	Micha	Vltava	Mirova	74001	2000-01-01
83	4085	Michal	Micha	Vltava	Mirova	74001	2000-01-01
84	4086	Michal	Micha	Vltava	Mirova	74001	2000-01-01
85	4087	Michal	Micha	Vltava	Mirova	74001	2000-01-01
86	4088	Michal	Micha	Vltava	Mirova	74001	2000-01-01
87	4089	Michal	Micha	Vltava	Mirova	74001	2000-01-01
88	4090	Michal	Micha	Vltava	Mirova	74001	2000-01-01
89	4091	Michal	Micha	Vltava	Mirova	74001	2000-01-01
90	4092	Michal	Micha	Vltava	Mirova	74001	2000-01-01
91	4093	Michal	Micha	Vltava	Mirova	74001	2000-01-01
92	4094	Michal	Micha	Vltava	Mirova	74001	2000-01-01
93	4095	Michal	Micha	Vltava	Mirova	74001	2000-01-01
94	4096	Michal	Micha	Vltava	Mirova	74001	2000-01-01
95	4097	Michal	Micha	Vltava	Mirova	74001	2000-01-01
96	4098	Michal	Micha	Vltava	Mirova	74001	2000-01-01
97	4099	Michal	Micha	Vltava	Mirova	74001	2000-01-01
98	4100	Michal	Micha	Vltava	Mirova	74001	2000-01-01
99	4101	Michal	Micha	Vltava	Mirova	74001	2000-01-01
100	4102	Michal	Micha	Vltava	Mirova	74001	2000-01-01

## CP 4

### View

```
/*CP4 VIEW*/  
CREATE VIEW PersonTours AS SELECT "Forename", "Surname", "E-mail", "Tour name" FROM "Person"  
FULL OUTER JOIN "Visited tours" ON "Person"."Person ID" =  
"Visited tours"."Person ID"  
FULL OUTER JOIN "Tour" ON "Visited tours"."Tour ID" =  
"Tour"."Tour ID";
```

WHERE		ORDER BY		
	Forename	Surname	E-mail	Tour name
1	Patricia	Leonard	PatLeo@gmail.com	Sedlec Area (Cathedral + Ossuary)
2	Patricia	Leonard	PatLeo@gmail.com	Sedlec Area + St. Barbara's Cathedral
3	Patricia	Leonard	PatLeo@gmail.com	Imperial Residence of Charles IV (basic tour)
4	Patricia	Leonard	PatLeo@gmail.com	Karlštejn Castle Chapels (exclusive tour)
5	Patricia	Leonard	PatLeo@gmail.com	The Great Tower View
6	Patricia	Leonard	PatLeo@gmail.com	Living in the castle
7	Patricia	Leonard	PatLeo@gmail.com	Building of the castle
8	Patricia	Leonard	PatLeo@gmail.com	The Castle - life in late medieval castle (basic tour)
9	Patricia	Leonard	PatLeo@gmail.com	The Kitchen and castle background
10	Patricia	Leonard	PatLeo@gmail.com	The Tower - from ruin to cultural heritage
11	Mary	Mierzejewski	MarMie@gmail.com	Sedlec Area (Cathedral + Ossuary)
12	Mary	Mierzejewski	MarMie@gmail.com	Sedlec Area + St. Barbara's Cathedral
13	Mary	Mierzejewski	MarMie@gmail.com	Imperial Residence of Charles IV (basic tour)
14	Mary	Mierzejewski	MarMie@gmail.com	Karlštejn Castle Chapels (exclusive tour)
15	Mary	Mierzejewski	MarMie@gmail.com	The Great Tower View
16	Mary	Mierzejewski	MarMie@gmail.com	Living in the castle
17	Mary	Mierzejewski	MarMie@gmail.com	Building of the castle
18	Mary	Mierzejewski	MarMie@gmail.com	The Castle - life in late medieval castle (basic tour)
19	Mary	Mierzejewski	MarMie@gmail.com	The Kitchen and castle background
20	Mary	Mierzejewski	MarMie@gmail.com	The Tower - from ruin to cultural heritage
21	Mary	Mierzejewski	MarMie@gmail.com	The Castle - life in late medieval castle (basic tour)
22	Mary	Mierzejewski	MarMie@gmail.com	Castle without barriers
23	Mary	Mierzejewski	MarMie@gmail.com	The secret of Cinderella's shoe
24	Mary	Mierzejewski	MarMie@gmail.com	Tour of the church
25	Mary	Mierzejewski	MarMie@gmail.com	Tour of the cathedral
26	Mary	Mierzejewski	MarMie@gmail.com	Castle Krakovec (basic tour)

```
SELECT * FROM PersonTours WHERE "Forename" = 'Donna' AND  
"Surname" = 'Olson'
```

	"Forename"	"Surname"	"E-mail"	"Tour name"
1	Donna	Olson	Don0ls@gmail.com	Sedlec Area (Cathedral + Ossuary)
2	Donna	Olson	Don0ls@gmail.com	Sedlec Area + St. Barbara's Cathedral
3	Donna	Olson	Don0ls@gmail.com	Imperial Residence of Charles IV (basic tour)
4	Donna	Olson	Don0ls@gmail.com	Karlštejn Castle Chapels (exclusive tour)
5	Donna	Olson	Don0ls@gmail.com	The Great Tower View
6	Donna	Olson	Don0ls@gmail.com	Living in the castle
7	Donna	Olson	Don0ls@gmail.com	Building of the castle
8	Donna	Olson	Don0ls@gmail.com	The Castle - life in late medieval castle (basic tour)
9	Donna	Olson	Don0ls@gmail.com	The Kitchen and castle background
10	Donna	Olson	Don0ls@gmail.com	The Tower - from ruin to cultural heritage
11	Donna	Olson	Don0ls@gmail.com	The Castle - life in late medieval castle (basic tour)
12	Donna	Olson	Don0ls@gmail.com	Castle without barriers
13	Donna	Olson	Don0ls@gmail.com	The secret of Cinderella's shoe
14	Donna	Olson	Don0ls@gmail.com	Tour of the church
15	Donna	Olson	Don0ls@gmail.com	Tour of the cathedral
16	Donna	Olson	Don0ls@gmail.com	Castle Krakovec (basic tour)
17	Donna	Olson	Don0ls@gmail.com	Tour of the castle
18	Donna	Olson	Don0ls@gmail.com	Castle during the rule of Valdstein (basic tour)
19	Donna	Olson	Don0ls@gmail.com	Castle during the rule of Thurn-Taxis
20	Donna	Olson	Don0ls@gmail.com	1st floor of the castle (basic circuit)
21	Donna	Olson	Don0ls@gmail.com	2nd floor of the castle (selection circuit)
22	Donna	Olson	Don0ls@gmail.com	The Royal Palace (basic tour)
23	Donna	Olson	Don0ls@gmail.com	Tour of the castle

## Index

```
/*Selects Forename, Surname and E-mail of people that visited
tour 13*/
SELECT "Forename", "Surname", "E-mail" FROM "Person" WHERE
"Person ID" IN (SELECT "Person ID" FROM "Visited tours" WHERE
"Tour ID" = 13);
EXPLAIN ANALYZE SELECT "Forename", "Surname", "E-mail" FROM
"Person" WHERE "Person ID" IN (SELECT "Person ID" FROM
"Visited tours" WHERE "Tour ID" = 13);
CREATE INDEX index_tour_id ON "Visited tours"("Tour ID");
```

### WITHOUT INDEX

```
1 Hash Join (cost=1036.78..1159.21 rows=2146 width=30) (actual time=18.909..22.036 rows=2187 loops=1)
2   Hash Cond: ("Person"."Person ID" = "Visited tours"."Person ID")
3   -> Seq Scan on "Person" (cost=0.00..86.59 rows=4559 width=34) (actual time=0.028..1.728 rows=4559 loops=1)
4   -> Hash (cost=1015.86..1015.86 rows=1674 width=4) (actual time=18.818..18.820 rows=2187 loops=1)
5         Buckets: 4096 (originally 2048) Batches: 1 (originally 1) Memory Usage: 109kB
6   -> HashAggregate (cost=999.12..1015.86 rows=1674 width=4) (actual time=17.781..18.226 rows=2187 loops=1)
7         Group Key: "Visited tours"."Person ID"
8         Batches: 1 Memory Usage: 241kB
9   -> Seq Scan on "Visited tours" (cost=0.00..993.75 rows=2146 width=4) (actual time=0.039..16.551 rows=2187 loops=1)
10        Filter: ("Tour ID" = 13)
11        Rows Removed by Filter: 53313
12 Planning Time: 5.264 ms
13 Execution Time: 22.570 ms
```

### WITH INDEX

```
1 Hash Join (cost=394.78..517.21 rows=2146 width=30) (actual time=5.012..7.332 rows=2187 loops=1)
2   Hash Cond: ("Person"."Person ID" = "Visited tours"."Person ID")
3   -> Seq Scan on "Person" (cost=0.00..86.59 rows=4559 width=34) (actual time=0.024..1.276 rows=4559 loops=1)
4   -> Hash (cost=373.85..373.85 rows=1674 width=4) (actual time=4.952..4.954 rows=2187 loops=1)
5         Buckets: 4096 (originally 2048) Batches: 1 (originally 1) Memory Usage: 109kB
6   -> HashAggregate (cost=357.11..373.85 rows=1674 width=4) (actual time=4.154..4.511 rows=2187 loops=1)
7         Group Key: "Visited tours"."Person ID"
8         Batches: 1 Memory Usage: 241kB
9   -> Bitmap Heap Scan on "Visited tours" (cost=24.92..351.75 rows=2146 width=4) (actual time=0.249..3.270 rows=2187 loops=1)
10        Recheck Cond: ("Tour ID" = 13)
11        Heap Blocks: exact=300
12   -> Bitmap Index Scan on index_tour_id (cost=0.00..24.38 rows=2146 width=0) (actual time=0.181..0.181 rows=2187 loops=1)
13        Index Cond: ("Tour ID" = 13)
14 Planning Time: 0.780 ms
15 Execution Time: 7.592 ms
```

## Trigger

```
CREATE OR REPLACE FUNCTION visitControl()
RETURNS TRIGGER AS
$$
BEGIN
    IF EXISTS(SELECT 1 FROM "Visited tours" WHERE "Tour ID" =
NEW."Tour ID" AND "Person ID" = NEW."Person ID")
        THEN RAISE EXCEPTION 'Combination of Tour ID and
Person ID already exists.';
    END IF;
    RETURN NEW;
END;
$$
LANGUAGE plpgsql;
```

```
CREATE TRIGGER visited_tours_check BEFORE INSERT ON "Visited
tours" FOR EACH ROW EXECUTE FUNCTION visitControl();
```

```
stankpe4.public> INSERT INTO "Visited tours" ("Tour ID", "Person ID") VALUES (1, 1)
[2023-05-04 17:15:19] [P0001] ERROR: Combination of Tour ID and Person ID already exists.
[2023-05-04 17:15:19] Kde: PL/pgSQL function visitcontrol() line 4 at RAISE
```

## Transaction

```
START TRANSACTION;
```

```
INSERT INTO "Person" ("Forename", "Surname", "E-mail", "City",
"Street", "Postal code", "Birth date")
VALUES ('Jan', 'Černý', 'javcern@seznam.cz', 'Praha',
'Evropská', '16000', '1897-04-13');
INSERT INTO "Employee" ("Person ID", "Salary") VALUES ('4560',
'35400');
INSERT INTO "Phone" ("Person ID", "Phone number") VALUES
('4560', '100557947');
```

```
COMMIT;
```

The screenshot shows a PostgreSQL client window with a SQL editor and a results pane. The SQL editor contains the following code:

```
1 START TRANSACTION;
2
3 INSERT INTO "Person" ("Forename", "Surname", "E-mail", "City", "Street", "Postal code", "Birth date")
4   VALUES ('Jan', 'Černý', 'javcern@seznam.cz', 'Praha', 'Evropská', '16000', '1897-04-13');
5   INSERT INTO "Employee" ("Person ID", "Salary") VALUES ('4560', '35400');
6   INSERT INTO "Phone" ("Person ID", "Phone number") VALUES ('4560', '100557947');
7
8 COMMIT;
```

The results pane shows an error message:

```
[23514] ERROR: new row for relation "Person" violates check constraint "Person_Birth_date_check"
Detail: Failing row contains (4561, Jan, Černý, javcern@seznam.cz, Praha, Evropská, 16000, 1897-04-13).
```

Below the error message, there is a log of the database session:

```
[2023-05-06 19:04:52] Connected to stankpe4
stankpe4> START TRANSACTION
[2023-05-06 19:04:53] completed in 28 ms
stankpe4> INSERT INTO "Person" ("Forename", "Surname", "E-mail", "City", "Street", "Postal code", "Birth date")
VALUES ('Jan', 'Černý', 'javcern@seznam.cz', 'Praha', 'Evropská', '16000', '1897-04-13')
[2023-05-06 19:04:53] [23514] ERROR: new row for relation "Person" violates check constraint "Person_Birth_date_check"
[2023-05-06 19:04:53] Detail: Failing row contains (4561, Jan, Černý, javcern@seznam.cz, Praha, Evropská, 16000, 1897-04-13).
```

If transaction wasn't used, we would insert nonsensical data into "Employee" and "Phone" tables.