

## Exercise Sheet 6

### Exercise 1.

Assume the relations given in Appendix A. Draw a **canonical operator tree** for following queries and denote the number of rows of the **intermediate result sets** of each operation in the tree:

- SELECT firstname, lastname FROM students WHERE sex='f'
- SELECT s.firstname, s.lastname, r.result, c.title FROM students s, results r, courses c WHERE s.matNr=r.matNr AND r.crsNr=c.crsNr AND c.crsNr=100
- A query for creating a list of aliases and the according first names and last names.

### Exercise 2.

Assume the relations given in Appendix A.

- Rewrite query c) from exercise 1 using **Algebraic Transformation Rules** in such a way that the intermediate results are reduced significantly. Please mark which rule you used and draw the resulting operator tree annotated with the new rows per intermediate result count.
- Discuss where and why pipelining could be used in your result.

### Exercise 3.

Assume the relations given in Appendix B. You want to retrieve all actors of the movie "Metropolis".

- Create an **SQL query** for performing that task and draw the canonical **operator tree**.
- Give your best estimation for the size of each **intermediate result set** in the operator tree in such a way that it is clear how you reached to that result.
- Give your best estimation for the necessary **number of block accesses** to perform the query.

### Exercise 4.

Assume the relations given in Appendix B. You want to retrieve all actors off all movies of type "cinema movie" released after 1980.

- Create an **SQL query** for performing that task and draw the canonical **operator tree**.
- Give your best estimation for the size of each **intermediate result set** in the operator tree in such a way that it is clear how you reached to that result.
- Give your best estimation for the necessary **number of block accesses** to perform the query.
- Discuss the effect of creating a secondary index on title.production\_year.

## Appendix A

### Students

matNr	firstName	lastName	sex
1000	Clark Joseph	Kent	m
1001	Lois	Lane	f
1002	Lex	Luthor	m
1003	Charles	Xavier	m
1004	Erik	Magnus	m
1005	Jean	Gray	f
1006	Ororo	Munroe	f
1007	Tony Edward	Stark	m
1008	Matt	Murdock	m
1009	Raven	Wagner	f
1010	Robert Bruce	Banner	m

### Results

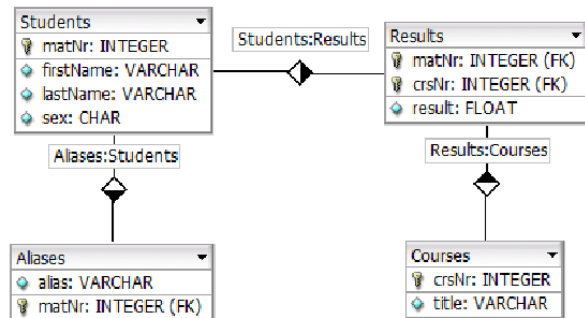
matNr	crsNr	result
1009	100	3.7
1002	102	5.0
1000	101	4.0
1000	100	1.3
1004	102	1.3
1003	101	1.7
1007	103	3.0
1006	100	1.7
1009	102	1.3
1003	103	1.0
1009	101	1.0
1008	101	1.7

### Aliases

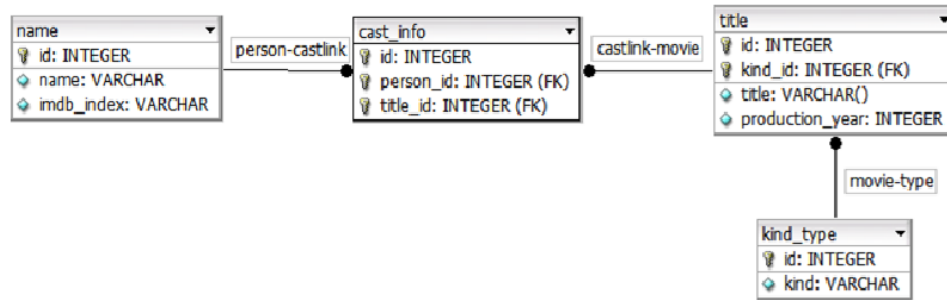
alias	matNr
Mystique	1009
Daredevil	1008
Kal-El	1000
Professor X	1003
Hulk	1010
Windrider	1006
Superman	1000
Phoenix	1005
Ironman	1007
Magneto	1004
Mockingbird	1002
Storm	1006
Golden Avenger	1007
Queen of Wakanda	1006

### Courses

crsNr	title
100	Introduction to Superheroism
101	Secret Identities 2
102	How to take over the world
103	Codes of Justice



## Appendix B



Following table/column statistics are available:

**Dense Primary Index on:**

name.id; cast\_info.id; title.id; kind\_type.id

**Secondary Index on:**

name.name; cast\_info.person\_id; cast\_info.title\_id; title.title

Table Name	Size	Blocks	Avg. Record Size
name	2,226,551	38,829	69
cast_info	15,387,808	235,718	60
title	1,181,300	24,573	82
kind_type	7	2	27

Column Name	Unique values	Min	Max
title.title	816,911	"Benjamin ...	österreich
title.prod_year	133	1861	2010
title.kind_id	7	1	7
kind_type.id	7	1	7
kind_type.kind	7	cinema movie	video
cast_info.id	15,387,808	1	15,387,922
cast_info.person_id	2,167,221	1	2167222
cast_info.title_id	1,095,682	1	1,175,063
name.id	2,226,551	1	2,227,221
name.name	2,008,733	\$, Steve	bumlungur
name.imdb_index	55	I	XXXVIII