
ORACLE®

Optimiertes Laden in die F-Fakten-Tabelle

SAP Business Warehouse

Jörn Bartels / Christoph Kersten

Server Technologies – SAP Development
19. November 2014

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Agenda

1. Standard Laden der F-Fakten Tabelle
2. Erste Optimierung
3. Unusable Indexes / Table Expansion
4. Optimierung mit Hinweis 1842044
5. Ausblick

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Standard Laden der F-Fakten Tabelle

Laden gegen Indices

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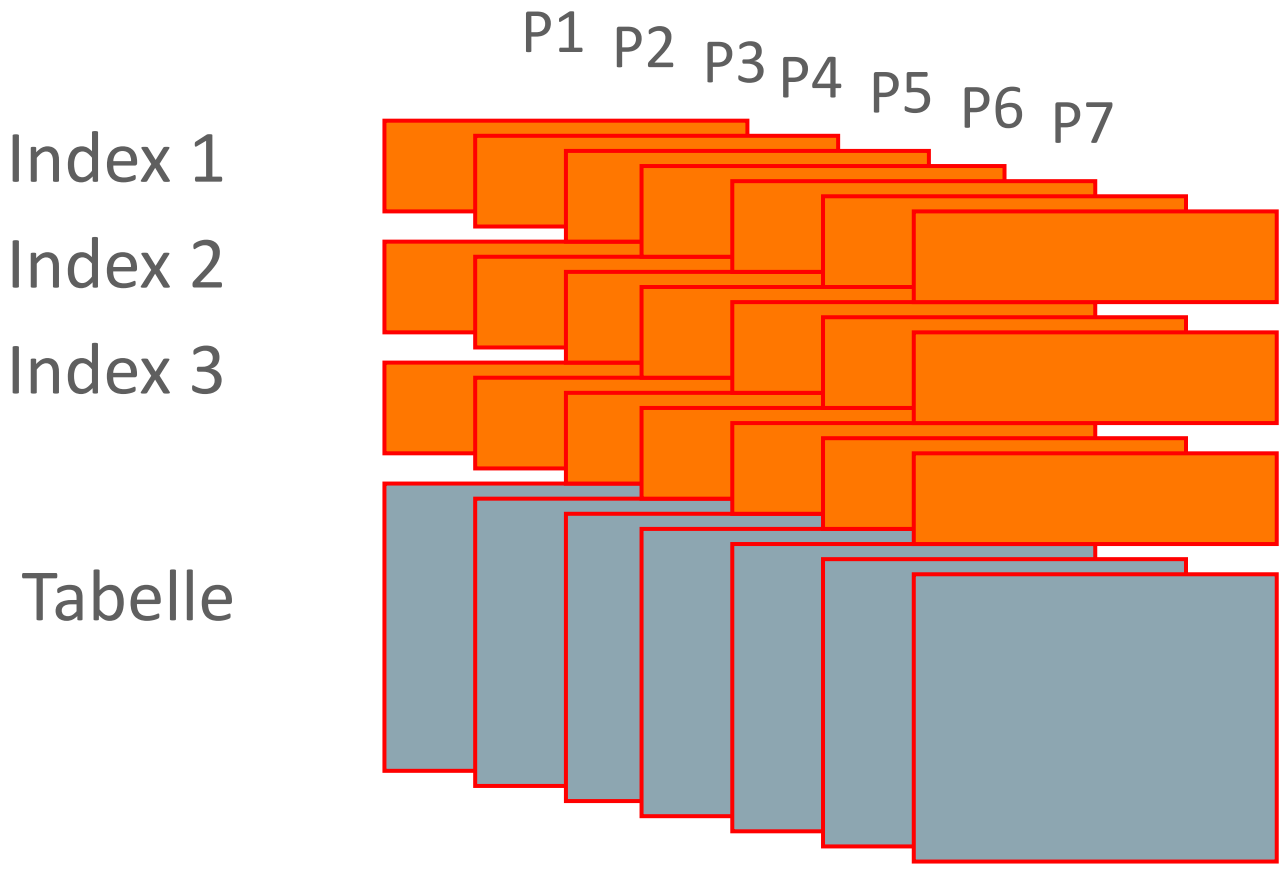
Laden gegen Indices



Beispiel

Tabelle: "/BI0/F0ATR_CR01"
Zeilen: 16,5 Milionen
Partitionen: 68
Größe: 1,2 GB

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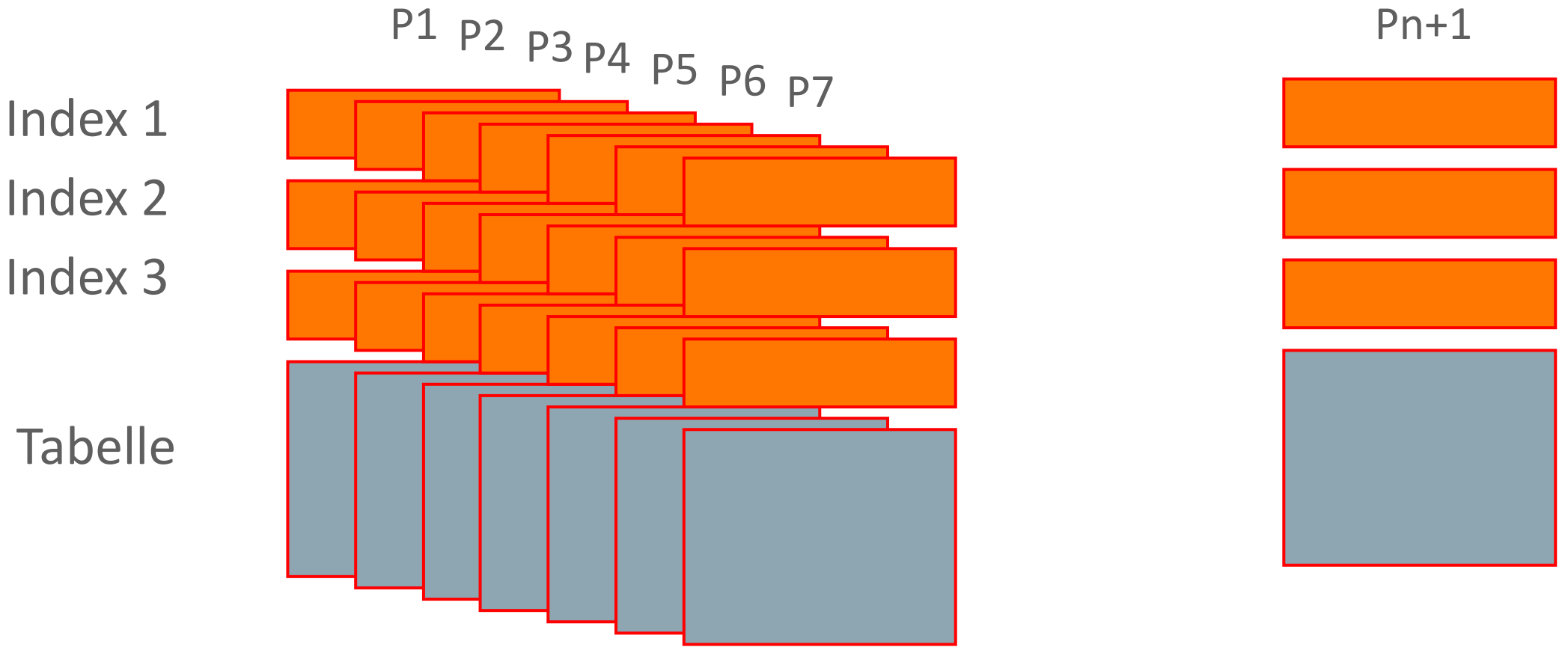
Laden gegen Indices
Neue Partition



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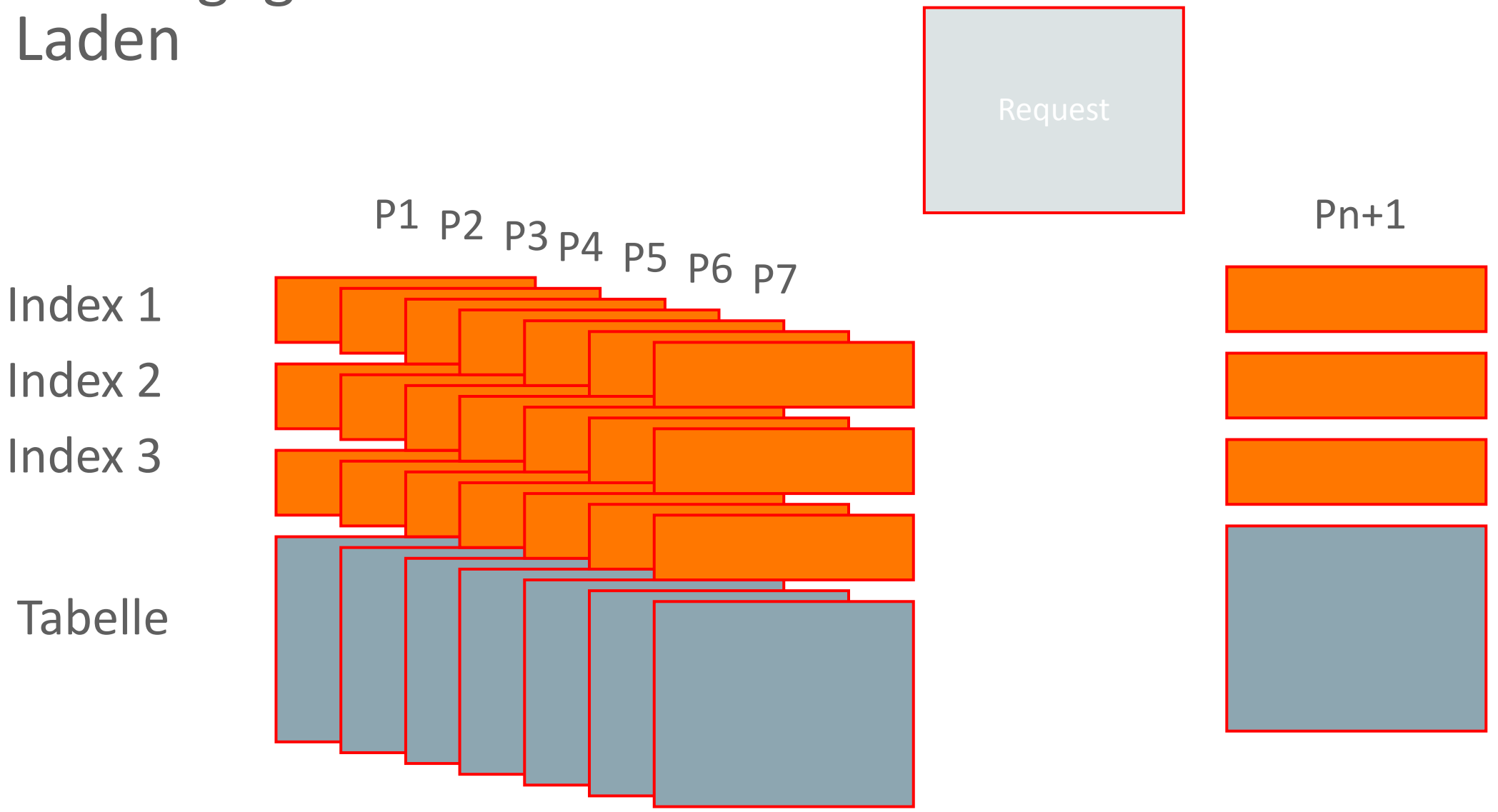
Laden gegen Indices
Laden



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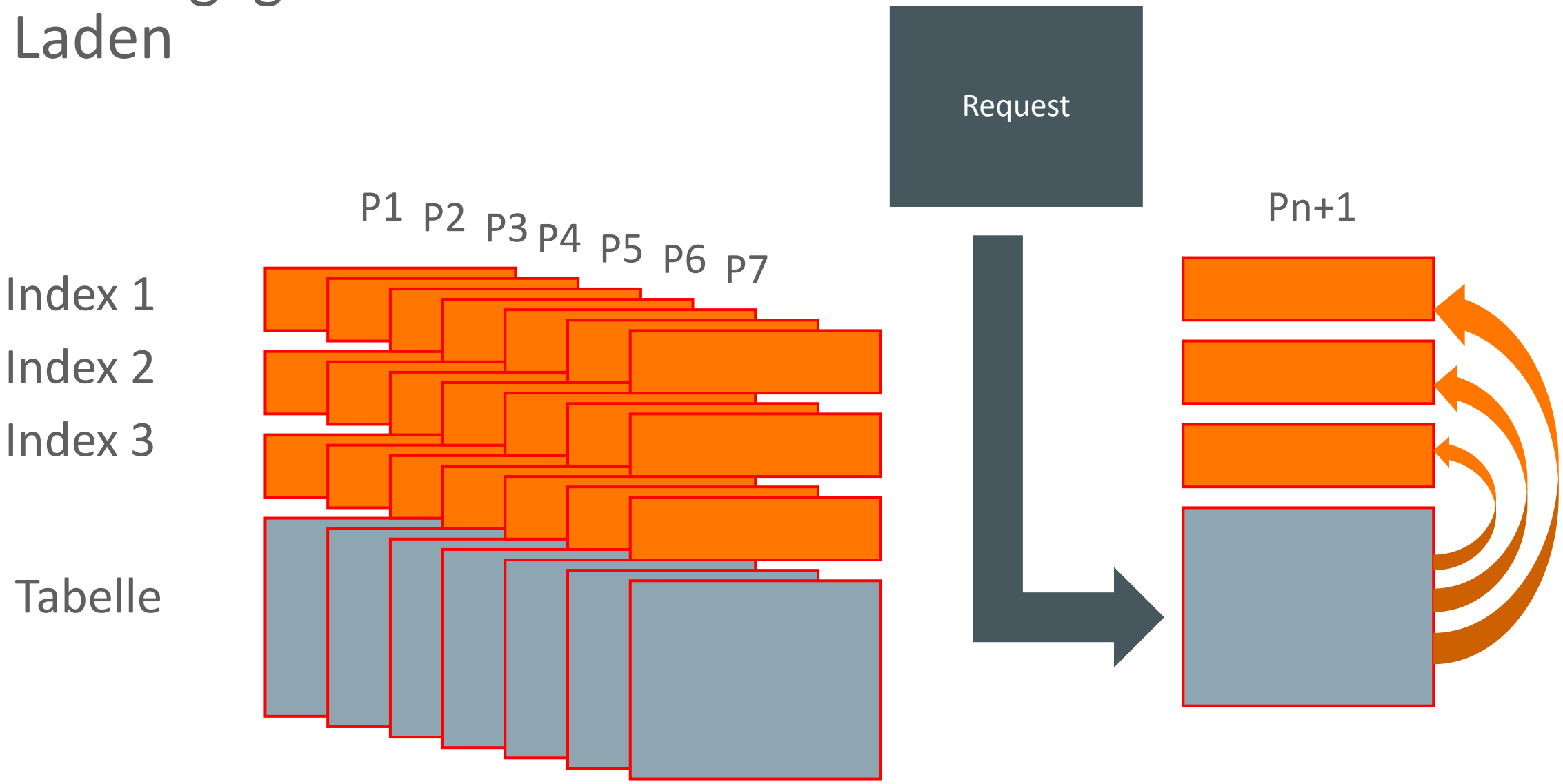
Laden gegen Indices
Laden



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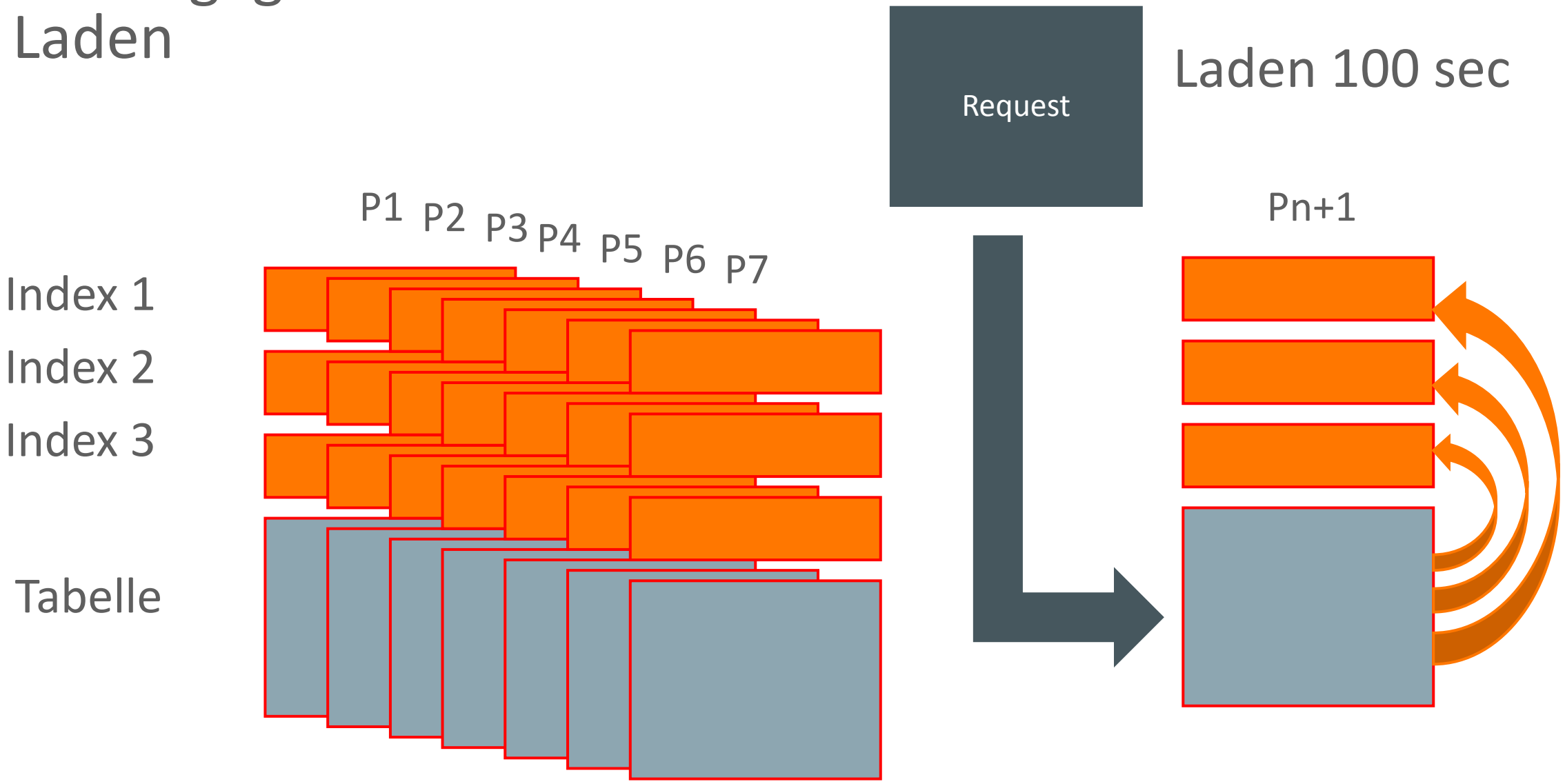
Laden gegen Indices
Laden



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Erste Optimierung

Löschen und Wiederaufbau der Indices

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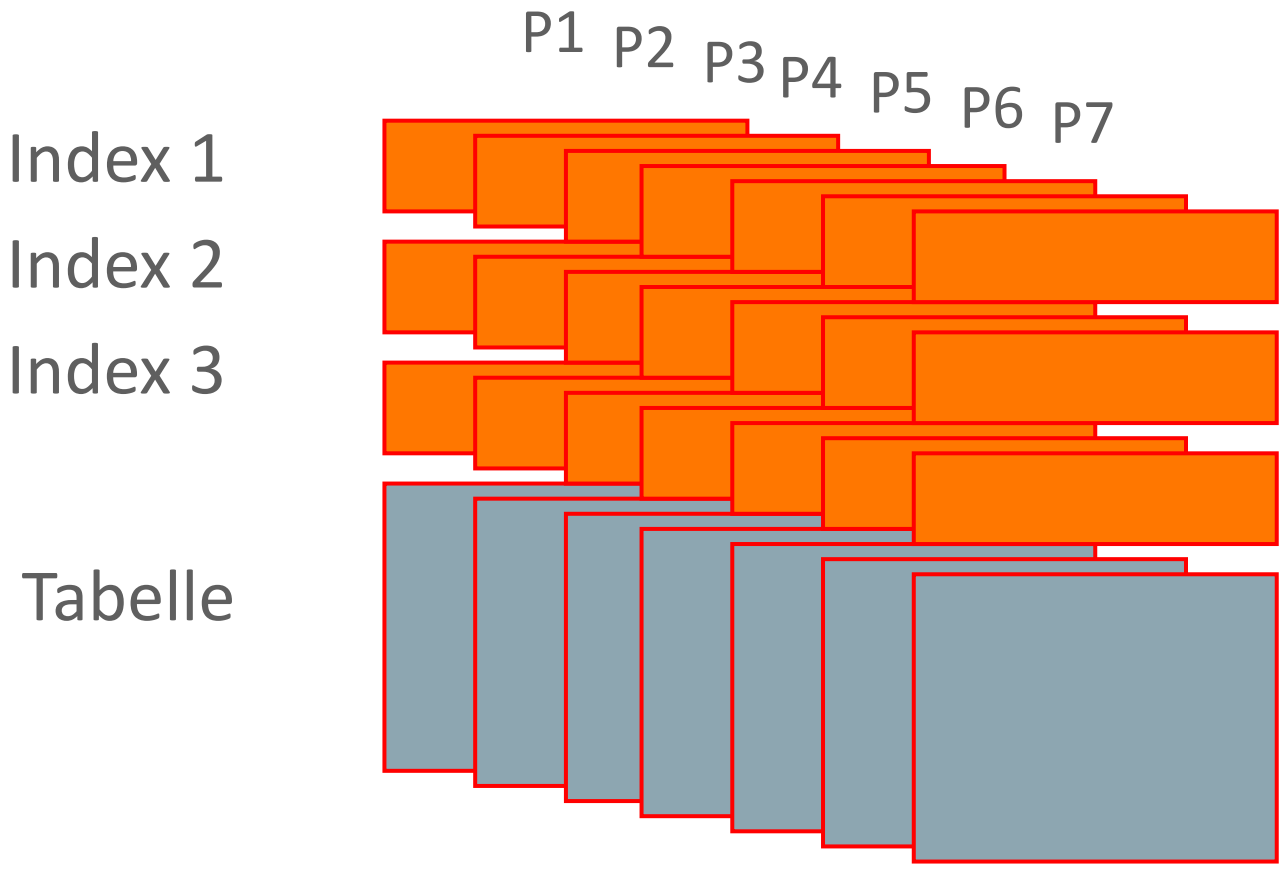
Löschen und Wiederaufbau der Indices



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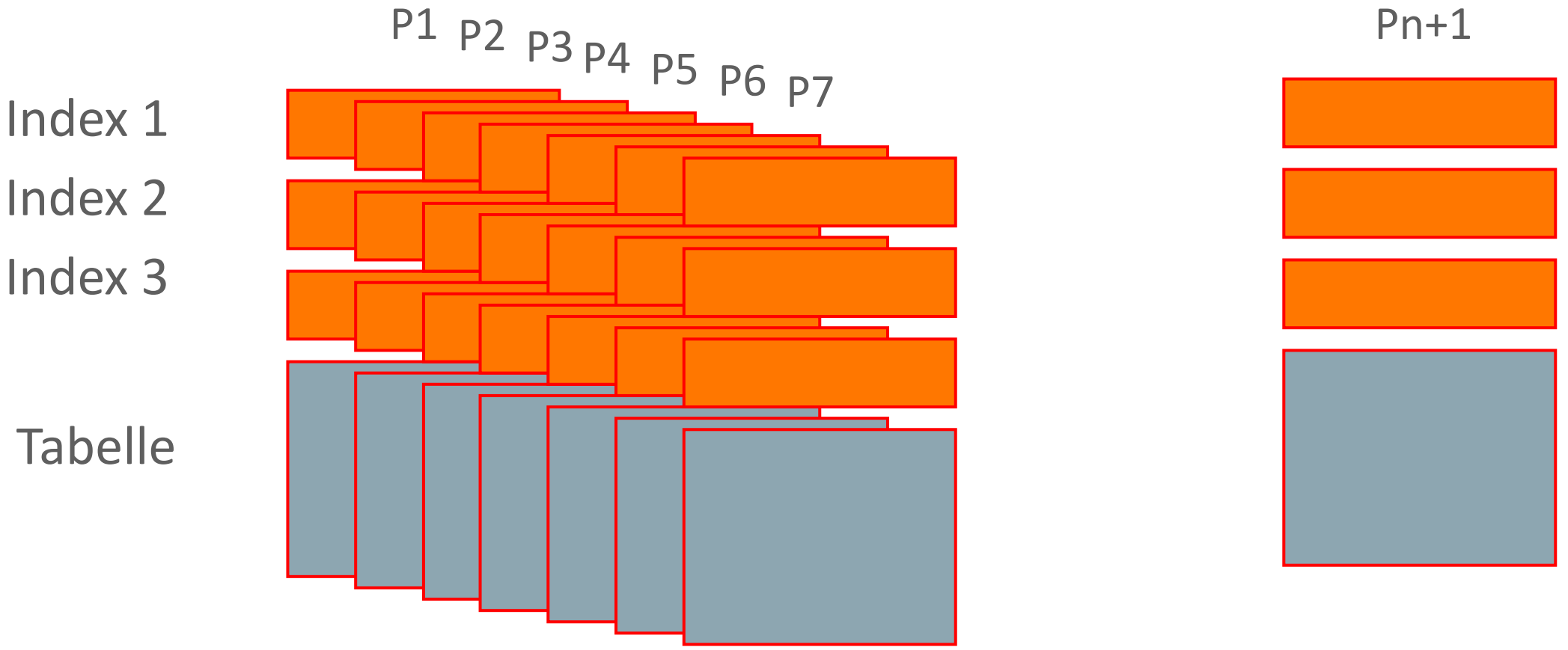
Löschen und Wiederaufbau der Indices
Neue Partition



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Löschen und Wiederaufbau der Indices
Löschen der Indices

P1 P2 P3 P4 P5 P6 P7

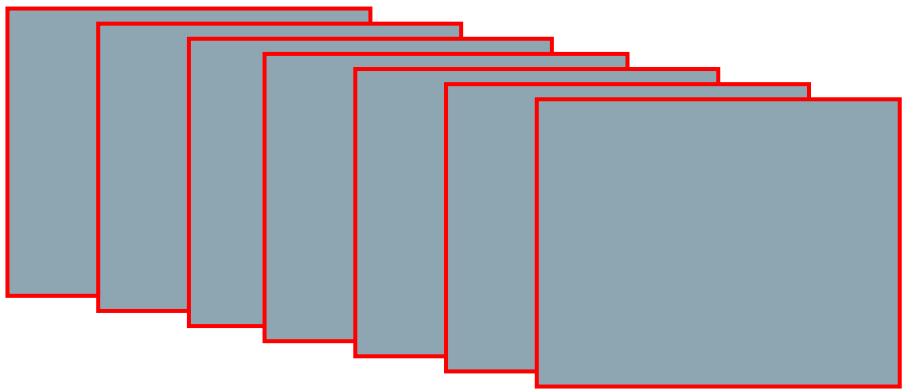
Pn+1

Index 1

Index 2

Index 3

Tabelle



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Löschen und Wiederaufbau der Indices

Laden

Laden 6 sec

Request

P1 P2 P3 P4 P5 P6 P7

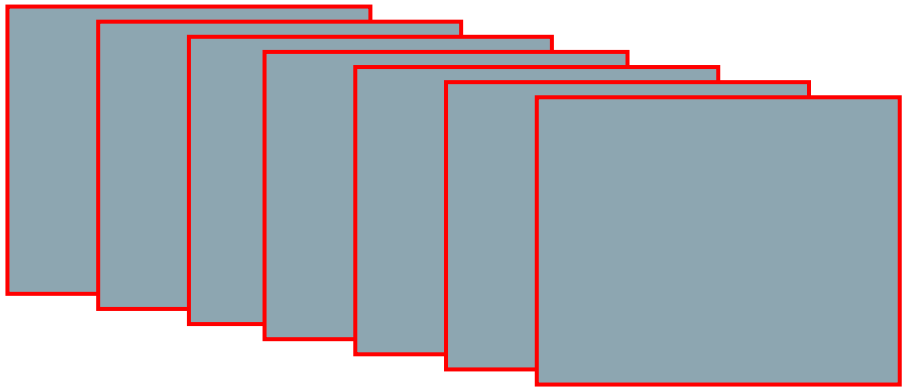
Pn+1

Index 1

Index 2

Index 3

Tabelle



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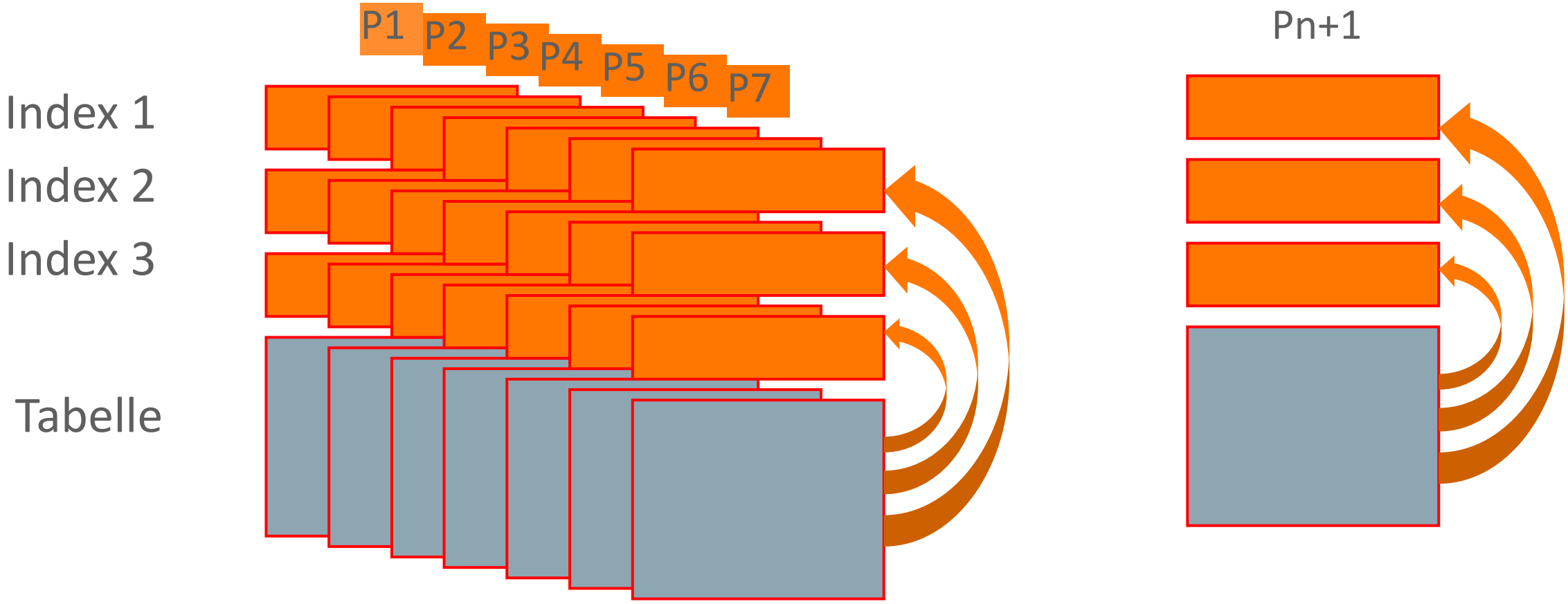
Löschen und Wiederaufbau der Indices
Index Aufbau

Laden 6 sec
Index 200 sec



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Unusable Indexes / Table Expansion

Unusable Index Partitions

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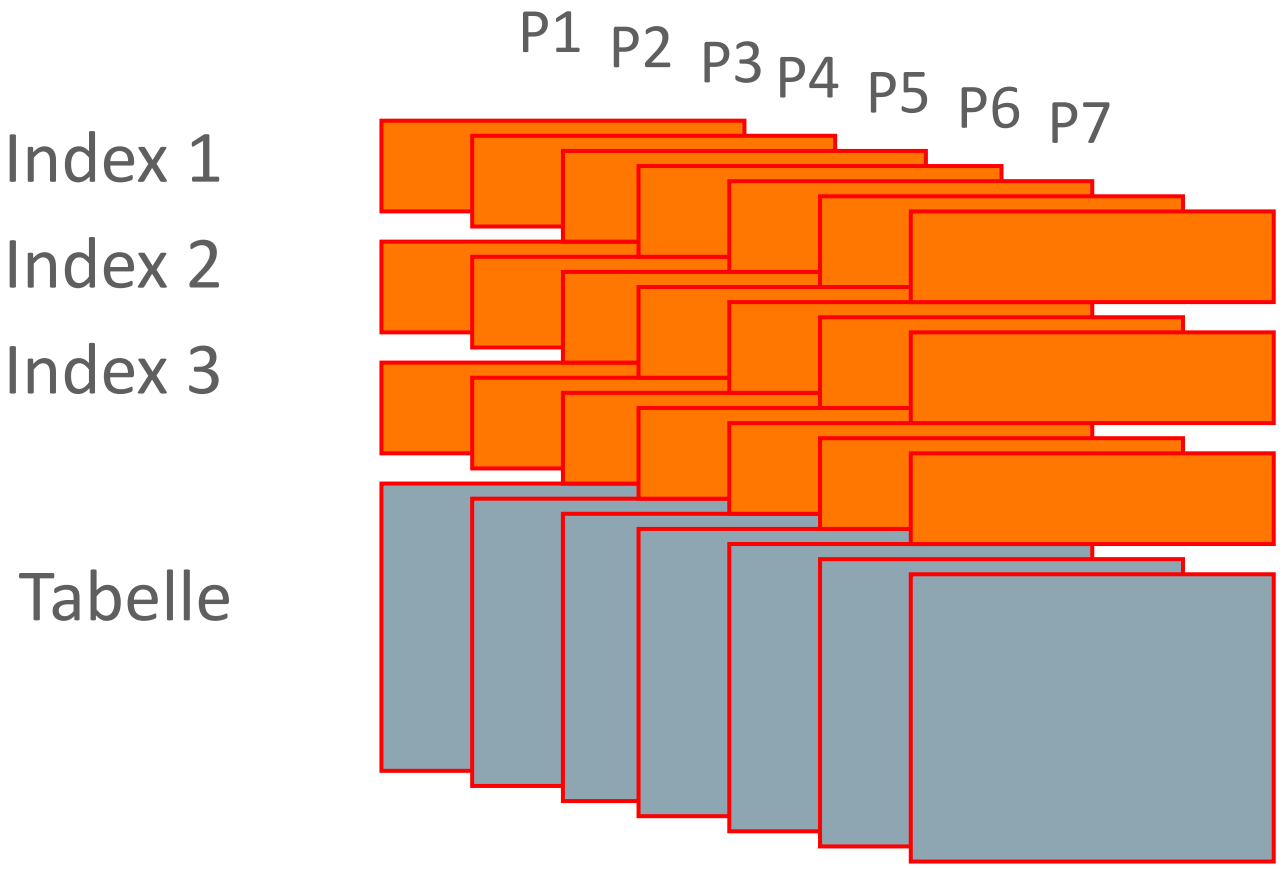
Unusable Index Partition



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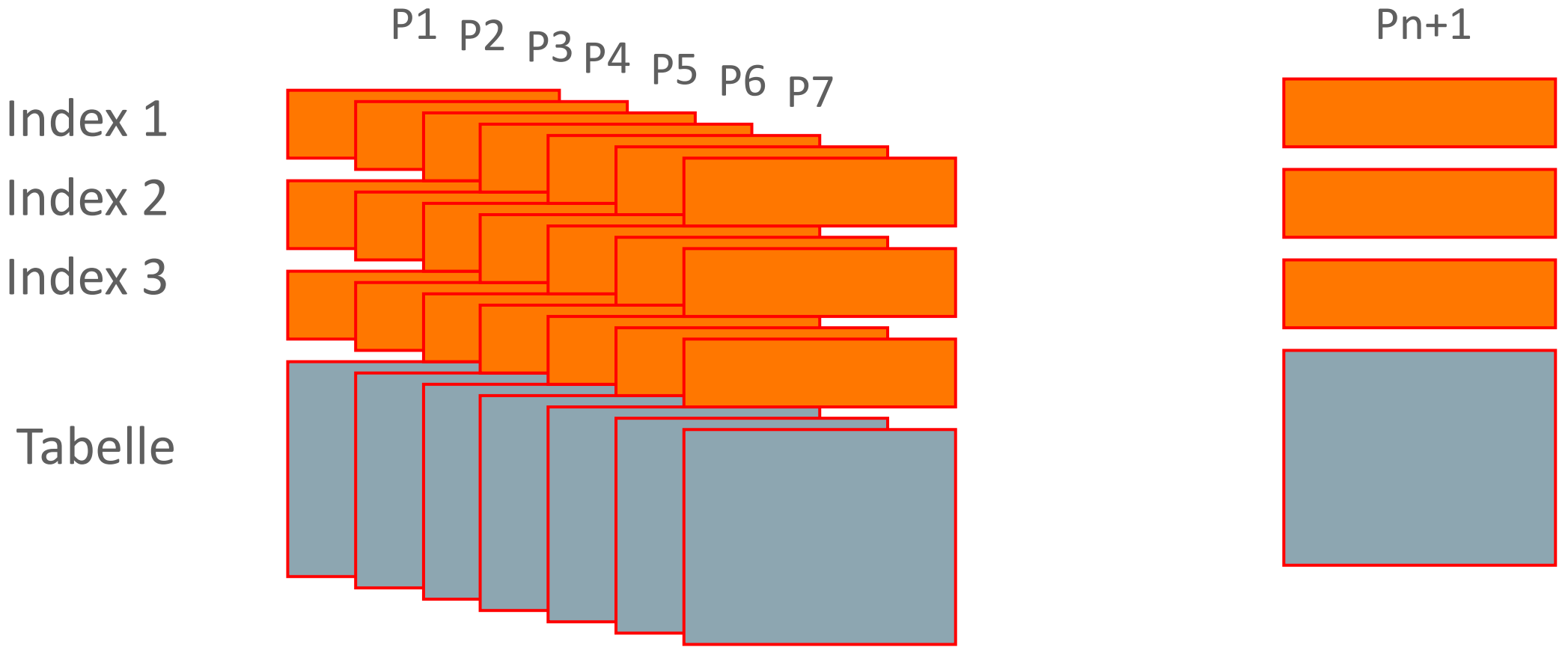
Unusable Index Partition
Neue Partition



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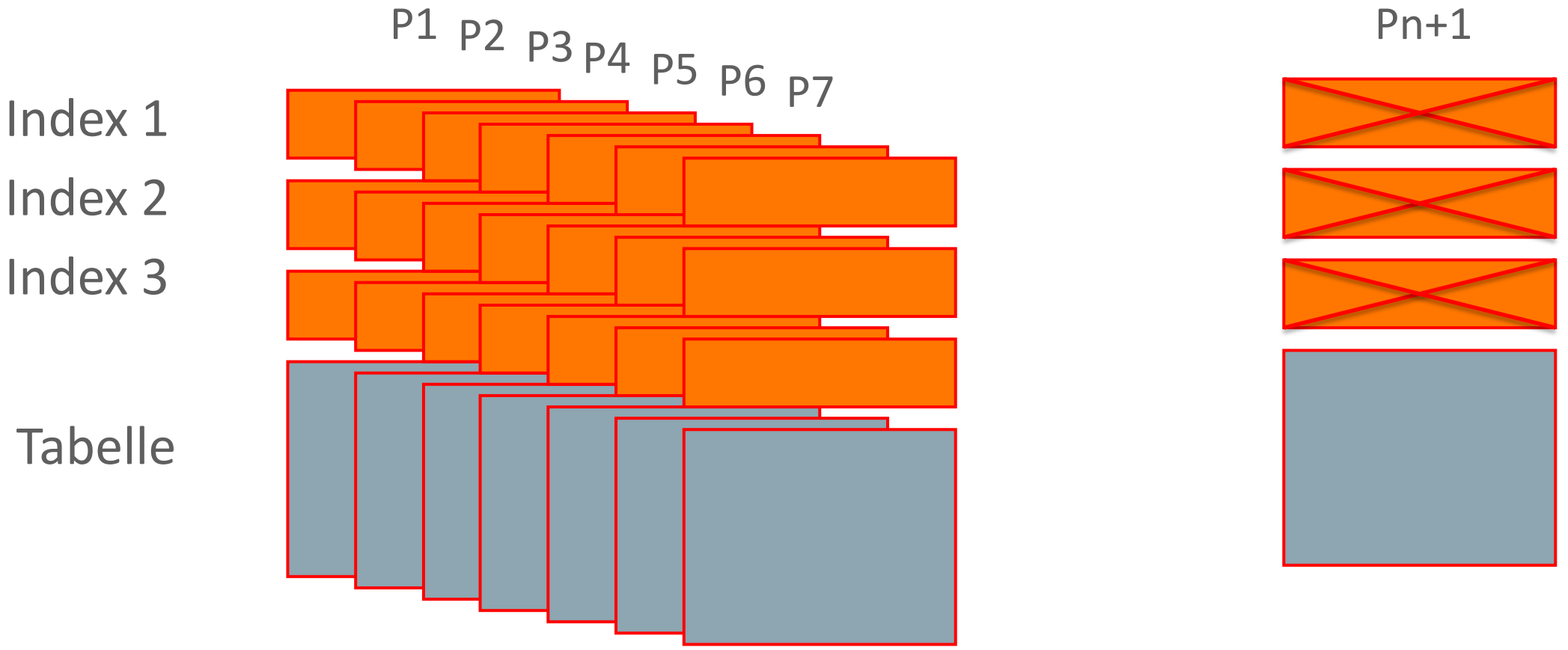
Unusable Index Partition
Set unusable



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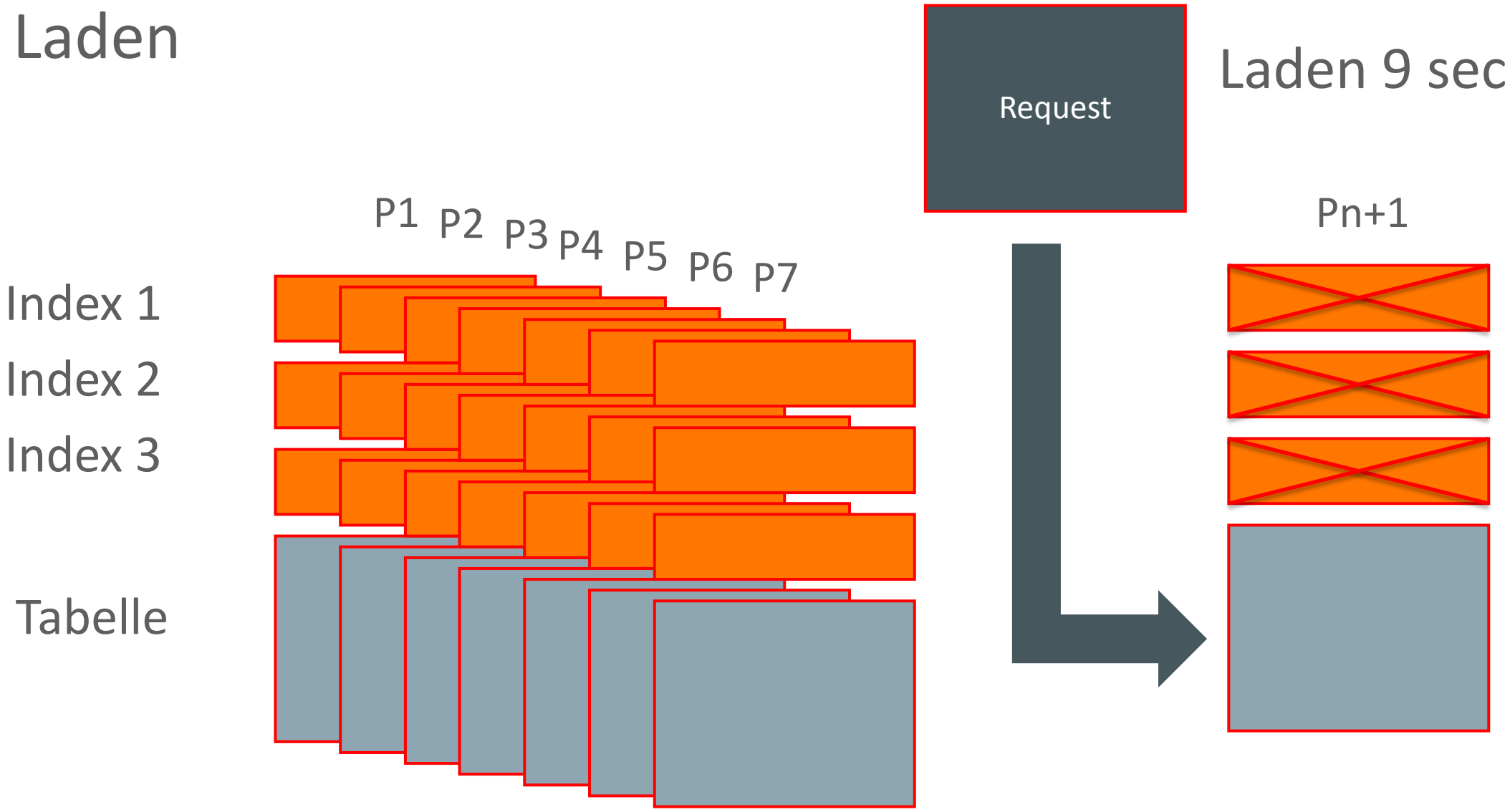
Unusable Index Partition Laden



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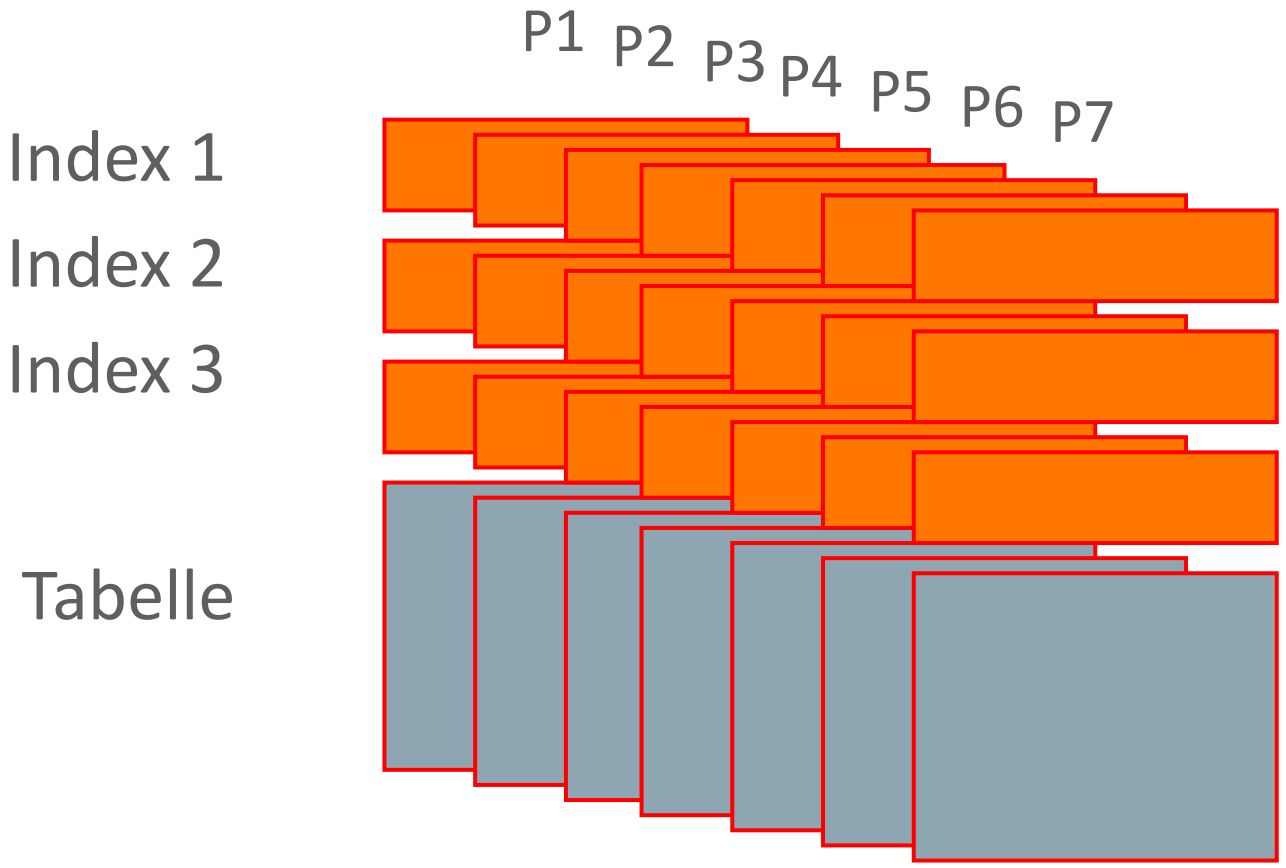
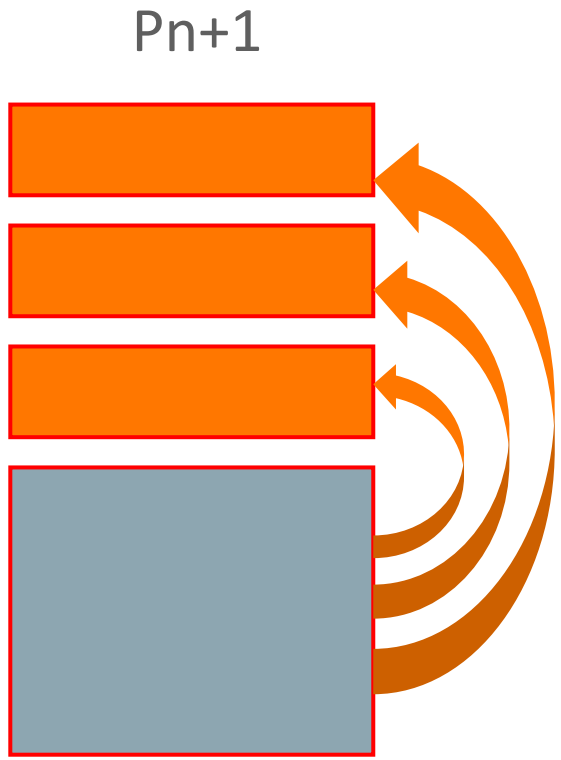
Unusable Index Partition Rebuild

Laden 9 sec
Index 1,5 sec





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Vergleich

	1 Request	10 Requests
Ohne Optimierung	100 sec	1000 sec
Alle Indices löschen	206 sec	260 sec
Unusable Index Part.	10,5 sec	105 sec

Ein großer Kunde hat eine Beschleunigung des Index Aufbaus nach dem Laden um den Faktor 10 gemessen.

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Unusable Indexes / Table Expansion

Query Rewrite mit Table Expansion

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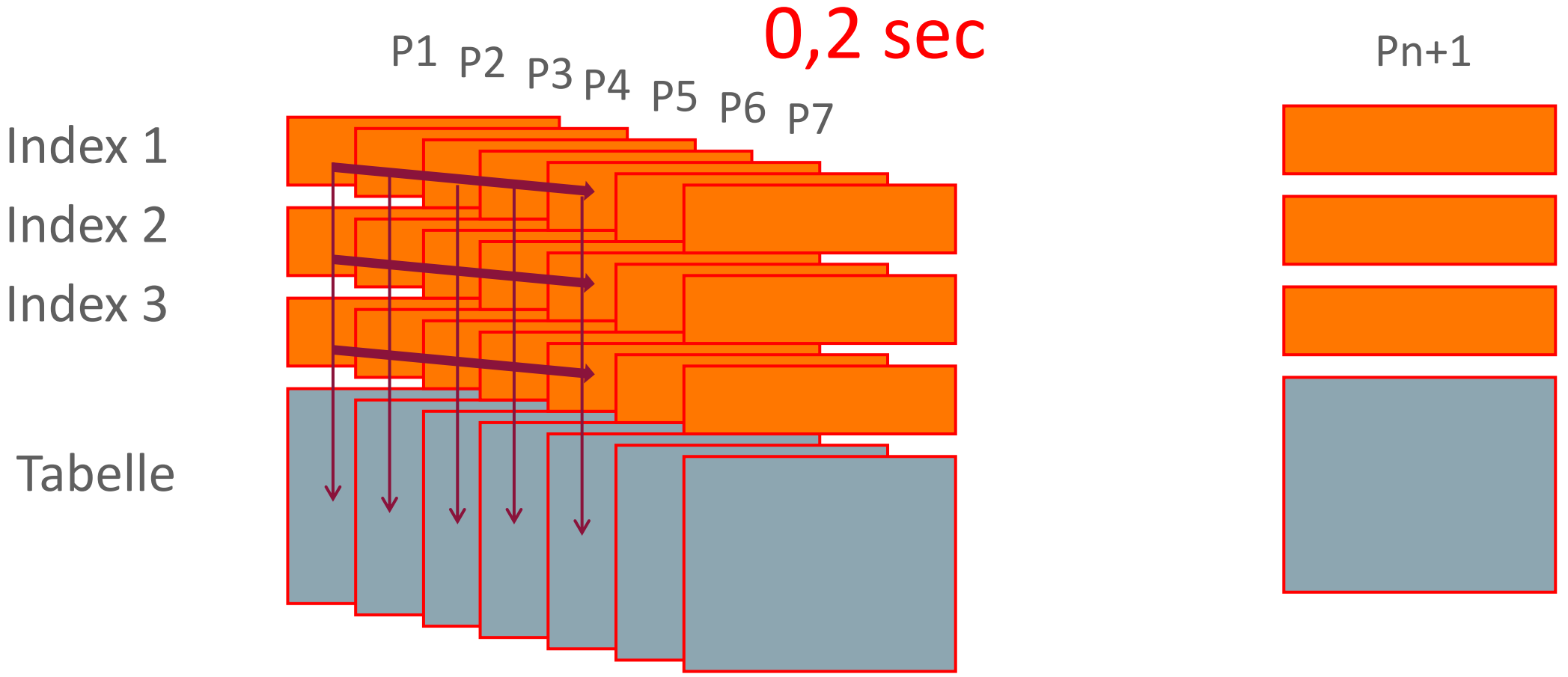
Query Rewrite mit Table Expansion
Zugriff mit kompletten Indices

```
select count (*) cnt, sum (f.ATR_CTTS) s1
from "/BIO/FOATR_CR01" F
where KEY_0ATR_CR01P < 65
and   KEY_0ATR_CR01T between 80 and 100
and   KEY_0ATR_CR012 between 6632 and 7792
```



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Query Rewrite mit Table Expansion
Zugriffsplan mit kompletten Indices

```
-------------------------------------------------------------------------
| Id  | Operation                                    | Name             |
-------------------------------------------------------------------------
|   0 | SELECT STATEMENT                             |                  |
|   1 |  SORT AGGREGATE                              |                  |
|   2 |   PARTITION RANGE ITERATOR                   |                  |
|   3 |    TABLE ACCESS BY LOCAL INDEX ROWID BATCHED| /BI0/F0ATR_CR01  |
|   4 |     BITMAP CONVERSION TO ROWIDS              |                  |
|   5 |      BITMAP AND                              |                  |
|   6 |       BITMAP MERGE                           |                  |
|*  7 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~02 |
|   8 |       BITMAP MERGE                           |                  |
|*  9 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~01 |
|  10 |       BITMAP MERGE                           |                  |
|* 11 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~04 |
-------------------------------------------------------------------------
```

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Query Rewrite mit Table Expansion
Zugriff ohne Indices

```
select count (*) cnt, sum (f.ATR_CTTS) s1
from "/BI0/F0ATR_CR01" F
where KEY_0ATR_CR01P < 65
and   KEY_0ATR_CR01T between 80 and 100
and   KEY_0ATR_CR012 between 6632 and 7792
```

15 sec

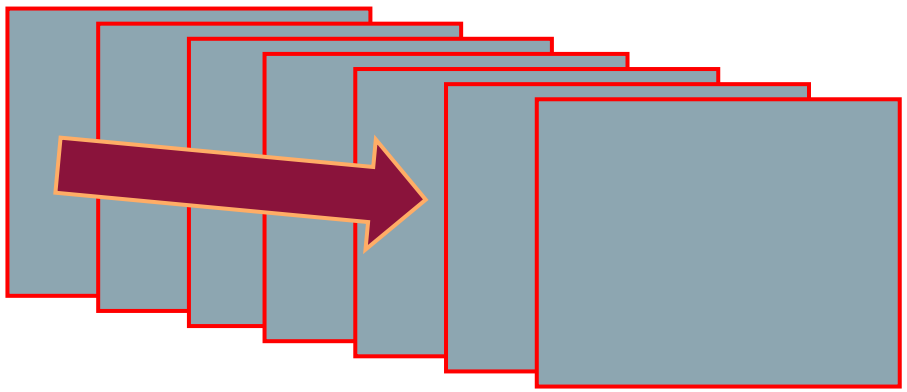
P1 P2 P3 P4 P5 P6 P7

Index 1

Index 2

Index 3

Tabelle



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Query Rewrite mit Table Expansion
Zugriffsplan ohne Indices

```
-----------------------------------------------------
| Id  | Operation                    | Name           |
-----------------------------------------------------
|   0 | SELECT STATEMENT             |                |
|   1 |  SORT AGGREGATE              |                |
|   2 |   PARTITION RANGE ITERATOR|                |
|   3 |    TABLE ACCESS FULL         | /BI0/F0ATR_CR01 |
-----------------------------------------------------
```

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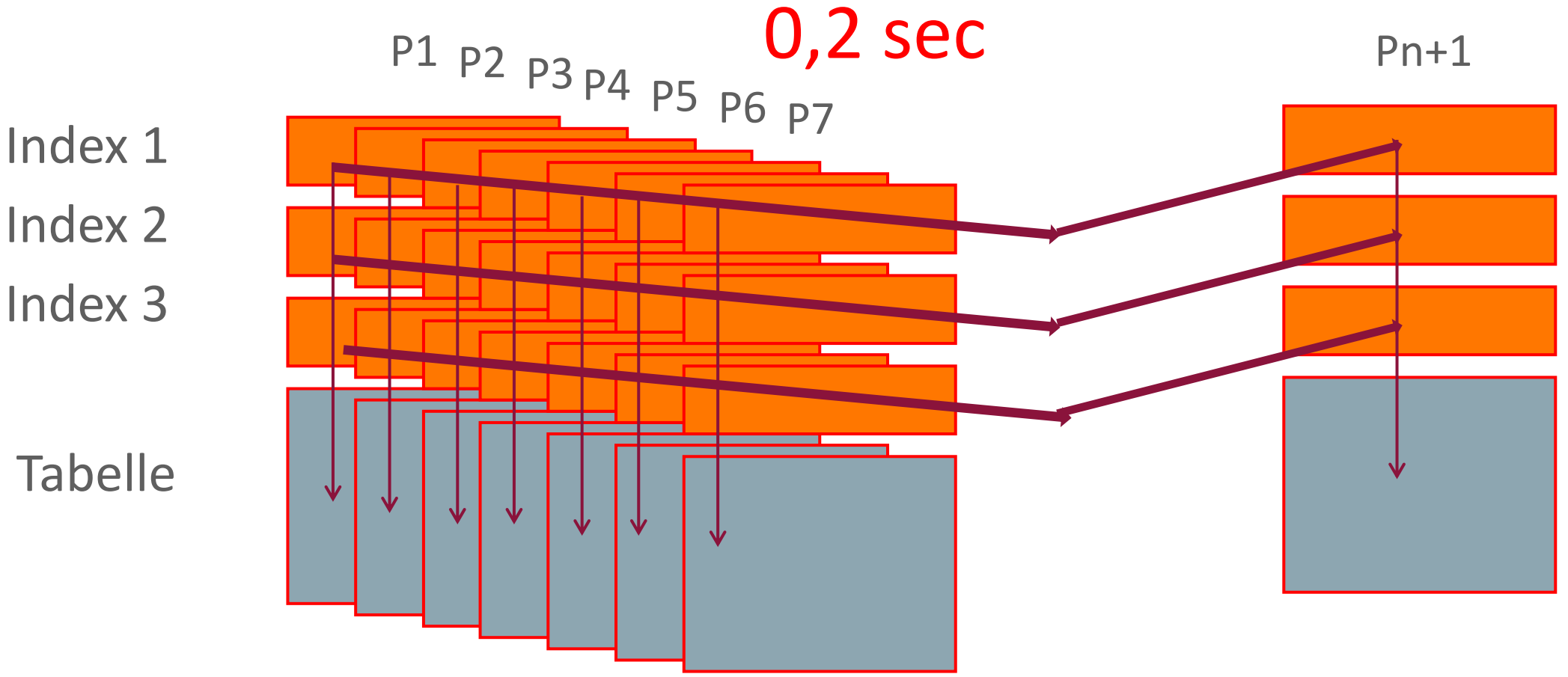
Query Rewrite mit Table Expansion
Zugriff mit kompletten Indices
Transactional cube

```
select count (*) cnt, sum (f.ATR_CTTS) s1
from "/BIO/FOATR_CR01" F
Where KEY_0ATR_CR01T between 80 and 100
and   KEY_0ATR_CR012 between 6632 and 7792
```



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Query Rewrite mit Table Expansion
Zugriff mit kompletten Indices
Transactional cube

```
-----------------------------------------------------------------------------
| Id  | Operation                                    | Name                   |
-----------------------------------------------------------------------------
|   0 | SELECT STATEMENT                             |                        |
|   1 |  SORT AGGREGATE                              |                        |
|   2 |   PARTITION RANGE ITERATOR                   |                        |
|   3 |    TABLE ACCESS BY LOCAL INDEX ROWID BATCHED| /BI0/F0ATR_CR01        |
|   4 |     BITMAP CONVERSION TO ROWIDS              |                        |
|   5 |      BITMAP AND                              |                        |
|   6 |       BITMAP MERGE                           |                        |
|*  7 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~02     |
|   8 |       BITMAP MERGE                           |                        |
|*  9 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~01     |
|  10 |       BITMAP MERGE                           |                        |
|* 11 |        BITMAP INDEX RANGE SCAN               | /BI0/F0ATR_CR01~04     |
-----------------------------------------------------------------------------
```

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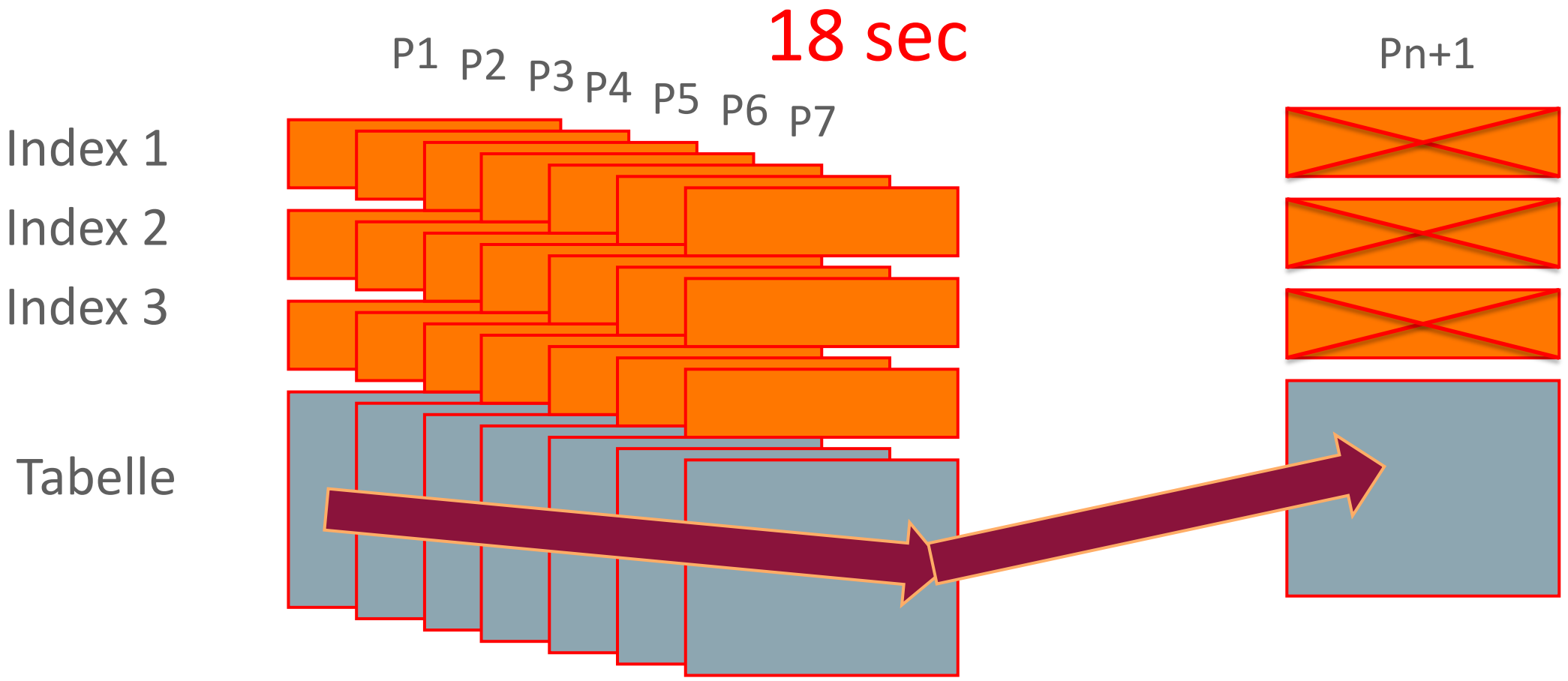
Query Rewrite mit Table Expansion
Zugriff mit unusable Index Partition
Transactional cube – 10.2



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Query Rewrite mit Table Expansion Zugriff mit unusable Index Partition Transactional cube – 10.2

```
-----------------------------------------------------
| Id  | Operation                    | Name           |
-----------------------------------------------------
|   0 | SELECT STATEMENT             |                |
|   1 |  SORT AGGREGATE              |                |
|   2 |   PARTITION RANGE ITERATOR|                |
|   3 |    TABLE ACCESS FULL         | /BI0/F0ATR_CR01 |
-----------------------------------------------------
```

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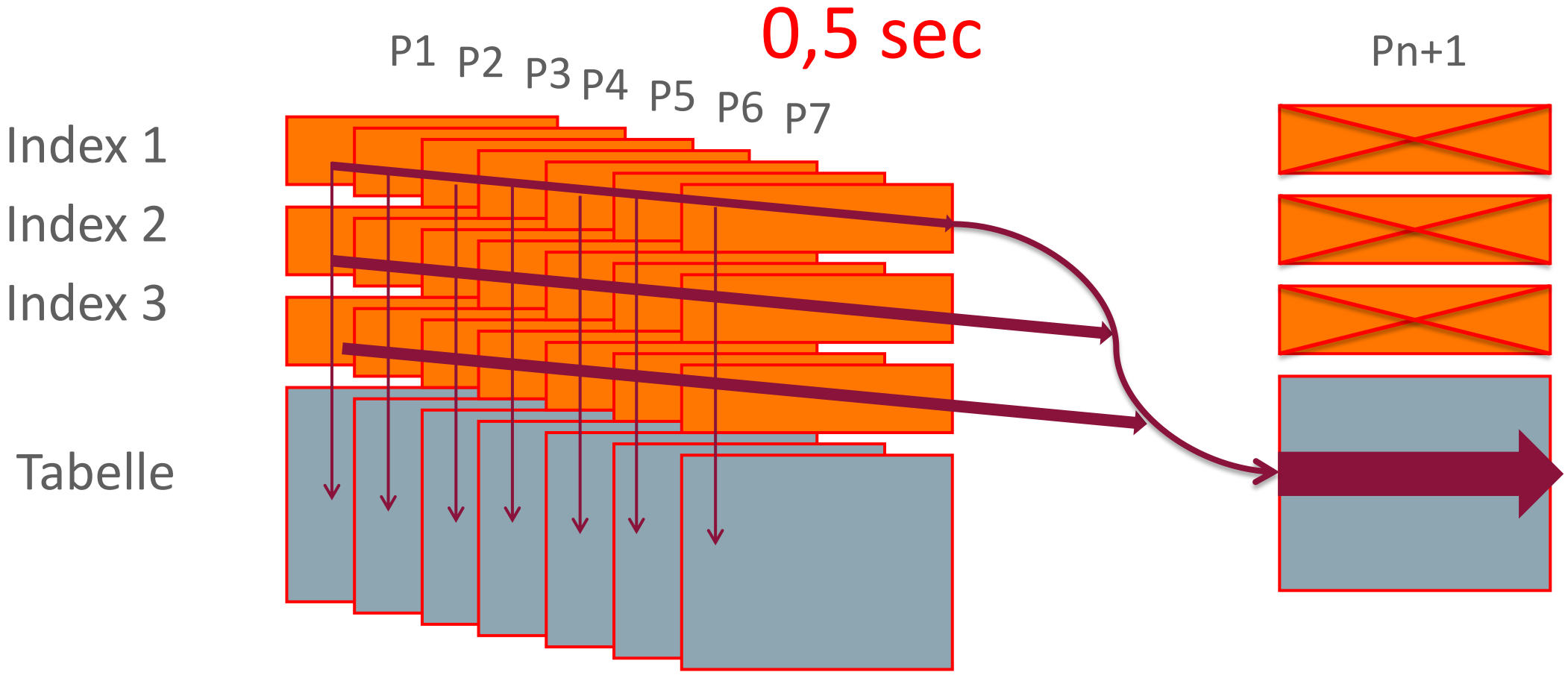
Query Rewrite mit Table Expansion Zugriff mit unusable Index Partition Transactional cube – 11.2

```
select count (*) cnt, sum (f.ATR_CTTS) s1
from "/BIO/FOATR_CR01" F
Where KEY_0ATR_CR01T between 80 and 100
and   KEY_0ATR_CR012 between 6632 and 7792
```



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Query Rewrite mit Table Expansion Zugriff mit unusable Index Partition Transactional cube – 11.2

```
Select sum (cnt), sum (s1)
From (select count (*) cnt, sum (f.ATR_CTTS) s1
      from "/BI0/F0ATR_CR01" F
      where PARTITION between 1 and 68
      and   KEY_0ATR_CR01T between 80 and 100
      and   KEY_0ATR_CR012 between 6632 and 7792
      Union all
      select count (*) cnt, sum (f.ATR_CTTS) s1
      from "/BI0/F0ATR_CR01" F
      where PARTITION = 69
      and   KEY_0ATR_CR01T between 80 and 100
      and   KEY_0ATR_CR012 between 6632 and 7792)
```

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Query Rewrite mit Table Expansion Zugriff mit unusable Index Partition Transactional cube – 11.2

```
-------------------------------------------------------------------------
|Id|Operation                                          |Name               |
-------------------------------------------------------------------------
| 0|SELECT STATEMENT                                   |                   |
| 1| SORT AGGREGATE                                    |                   |
| 2|  VIEW                                             |VW_TE_2            |
| 3|   UNION-ALL                                       |                   |
| 4|    PARTITION RANGE ITERATOR                       |                   |
| 5|     TABLE ACCESS BY LOCAL INDEX ROWID BATCHED|/BI0/F0ATR_CR01   |
| 6|      BITMAP CONVERSION TO ROWIDS                  |                   |
| 7|       BITMAP AND                                  |                   |
| 8|        BITMAP MERGE                               |                   |
| 9|         BITMAP INDEX RANGE SCAN                   |/BI0/F0ATR_CR01~02|
|10|        BITMAP MERGE                               |                   |
|11|         BITMAP INDEX RANGE SCAN                   |/BI0/F0ATR_CR01~01|
|12|        BITMAP MERGE                               |                   |
|13|         BITMAP INDEX RANGE SCAN                   |/BI0/F0ATR_CR01~04|
|14|    PARTITION RANGE SINGLE                         |                   |
|15|     TABLE ACCESS FULL                             |/BI0/F0ATR_CR01   |
```

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Optimierung mit Hinweis 1842044

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Optimierung mit Hinweis 1842044

- Ist in den folgenden Support Packages enthalten:
  - SAP NetWeaver BW 7.30 – SP 10
  - SAP NetWeaver BW 7.31 – SP 8
  - SAP NetWeaver BW 7.40 – SP 3
- Sonst Hinweis 1842044 mit SNOTE einspielen.
- Aktivieren mit:
  - In die Tabelle RSADMIN den folgenden Parameter aufnehmen:
  - OBJECT = ORA_IC_LOAD_NO_DROP VALUE = X

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Ausblick

Transactional Cubes mit Bitmap Indices
Compression der geladenen Partitionen
Lokale Index Compression mit 12c

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Ausblick
Transactional Cubes mit Bitmap Indices

- Transactional Cubes können mit Bitmap Indices definiert werden
- Volle Star Query Unterstützung

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Ausblick
Compression der geladenen Partitionen

- Laden in unkomprimierte Partition
- Komprimieren bevor die Indizes wieder aufgebaut werden
  - Alter table xx move partition yy compress
- Jeder Block wird nur einmal komprimiert
- Ohne Advanced Compression Option möglich.
- Mit 12c auch Hybrid Columnar Compression.

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Lokale Index Compression mit 12c

- Automatische Berechnung der Präfixlänge pro Block
- Bessere Komprimierung (5-20%)
- Benötigt ACO

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Pilotkunden????

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Fragen???

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