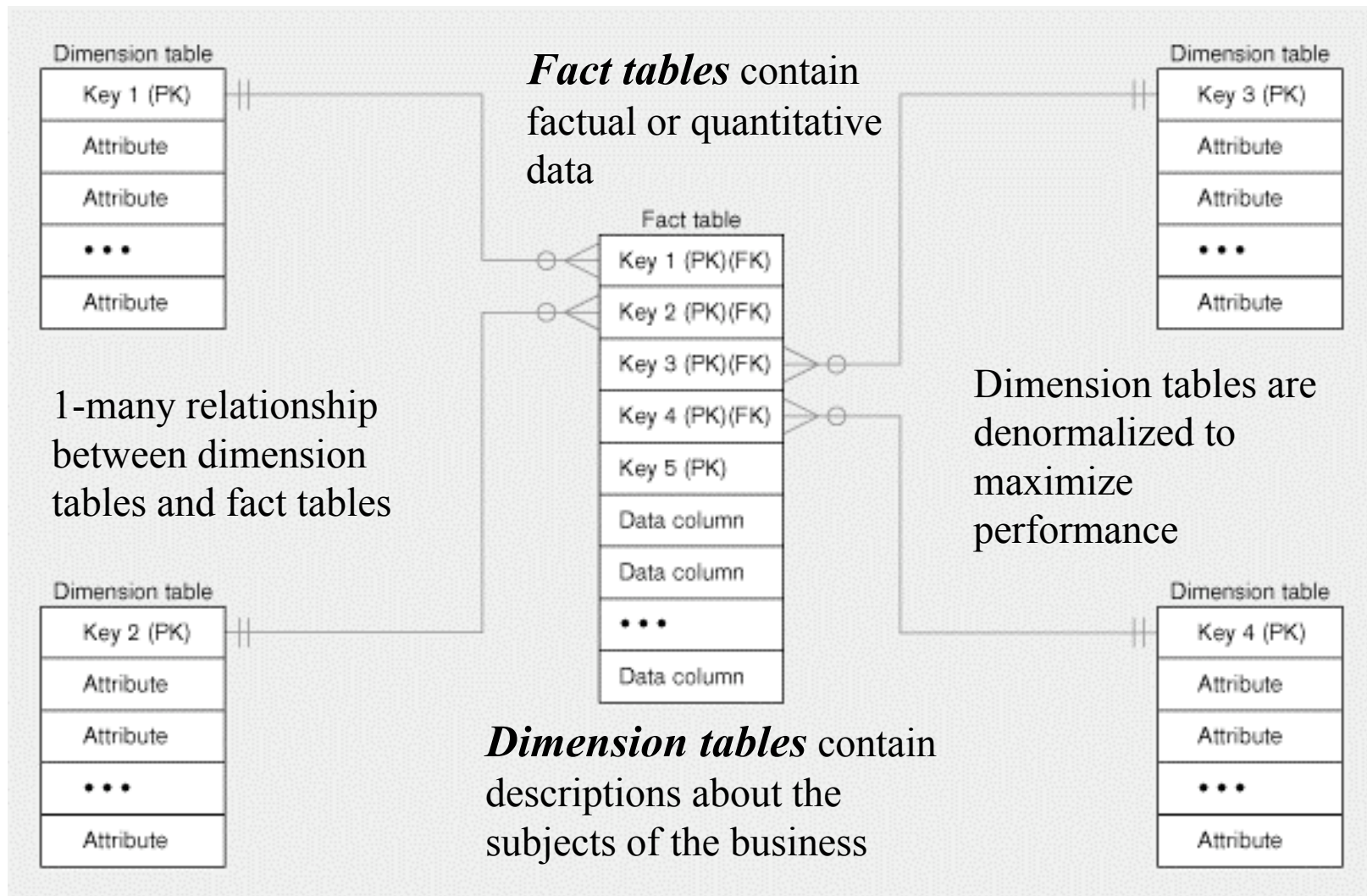# Modern Database Management
7th Edition, Chapter 11

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Slides edited by Rasmus Pagh

Figure 11-13: Components of a **star schema**

Dimension table

Key 1 (PK)
Attribute
Attribute
. . .
Attribute

Fact tables contain factual or quantitative data

Dimension table

Key 3 (PK)
Attribute
Attribute
. . .
Attribute

Fact table

Key 1 (PK)(FK)
Key 2 (PK)(FK)
Key 3 (PK)(FK)
Key 4 (PK)(FK)
Key 5 (PK)
Data column
Data column
. . .
Data column

1-many relationship between dimension tables and fact tables

Dimension tables are denormalized to maximize performance

Dimension table

Key 2 (PK)
Attribute
Attribute
. . .
Attribute

Dimension table

Key 4 (PK)
Attribute
Attribute
. . .
Attribute

Dimension tables contain descriptions about the subjects of the business

Data in fact table are called **measures** (or **dependent attributes**)

Figure 11-14: Star schema example

PRODUCT

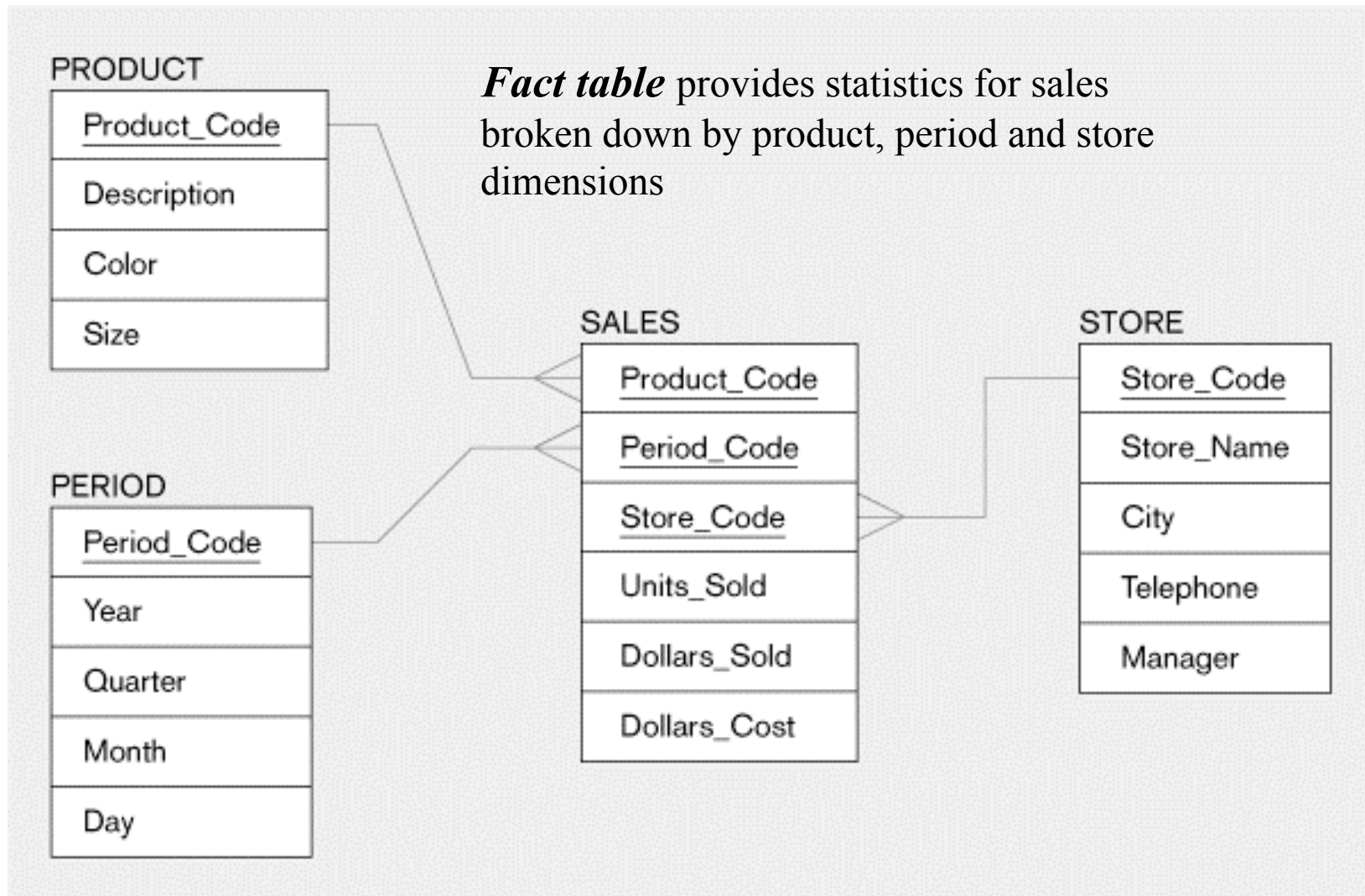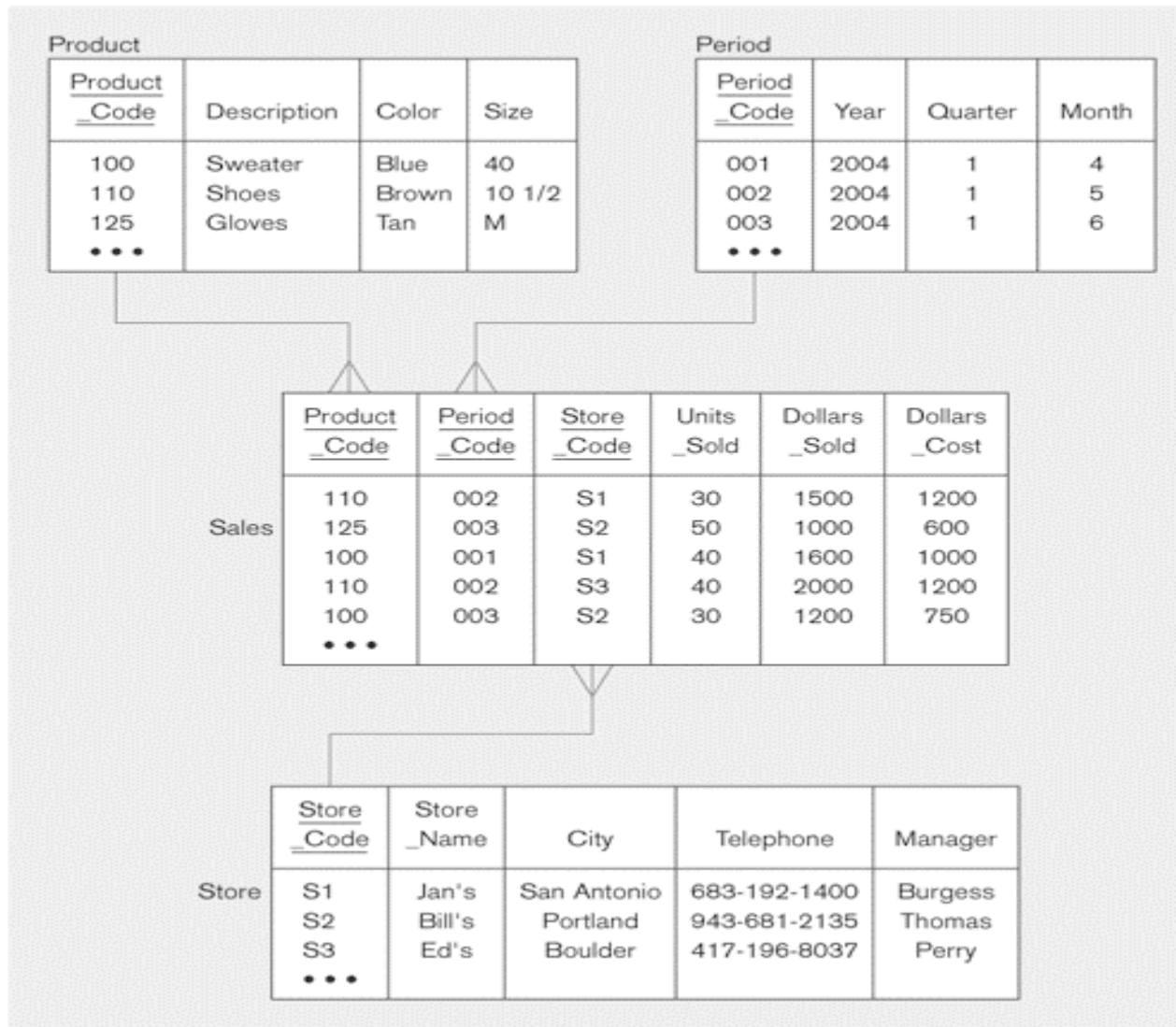| Product_Code |
| Description |
| Color |
| Size |

Fact table provides statistics for sales broken down by product, period and store dimensions

SALES

| Product_Code |
| Period_Code |
| Store_Code |
| Units_Sold |
| Dollars_Sold |
| Dollars_Cost |

STORE

| Store_Code |
| Store_Name |
| City |
| Telephone |
| Manager |

PERIOD

| Period_Code |
| Year |
| Quarter |
| Month |
| Day |

Chapter 11

Figure 11-15 Star schema with sample data

Product

Product _Code	Description	Color	Size
100	Sweater	Blue	40
110	Shoes	Brown	10 1/2
125	Gloves	Tan	M
• • •			

Period

Period _Code	Year	Quarter	Month
001	2004	1	4
002	2004	1	5
003	2004	1	6
• • •			

Sales

Product _Code	Period _Code	Store _Code	Units _Sold	Dollars _Sold	Dollars _Cost
110	002	S1	30	1500	1200
125	003	S2	50	1000	600
100	001	S1	40	1600	1000
110	002	S3	40	2000	1200
100	003	S2	30	1200	750
• • •					

Store

Store _Code	Store _Name	City	Telephone	Manager
S1	Jan's	San Antonio	683-192-1400	Burgess
S2	Bill's	Portland	943-681-2135	Thomas
S3	Ed's	Boulder	417-196-8037	Perry
• • •				

Issues Regarding Star Schema

- Dimension table keys should be **surrogate** (non-intelligent and non-business related), because:
  - Keys may change over time
  - Smaller space usage

- Granularity of Fact Table – what level of detail do you want?
  - Transactional grain – finest level
  - Aggregated grain – more summarized
  - Finer grains ➜ better **market basket analysis** capability
  - Finer grain ➜ more dimension tables, more rows in fact table

- Duration of the database – how much history should be kept?
  - General guideline: As much as the technology employed allows.

Data cube view of OLAP

- Most common way of thinking about OLAP data: Facts correspond to point in a multi-dimensional cube.

- Uses a set of (graphical) tools that provides users with multidimensional views of their data and allows them to analyze the data using simple windowing techniques.

Products

Months

Measures

Shoes
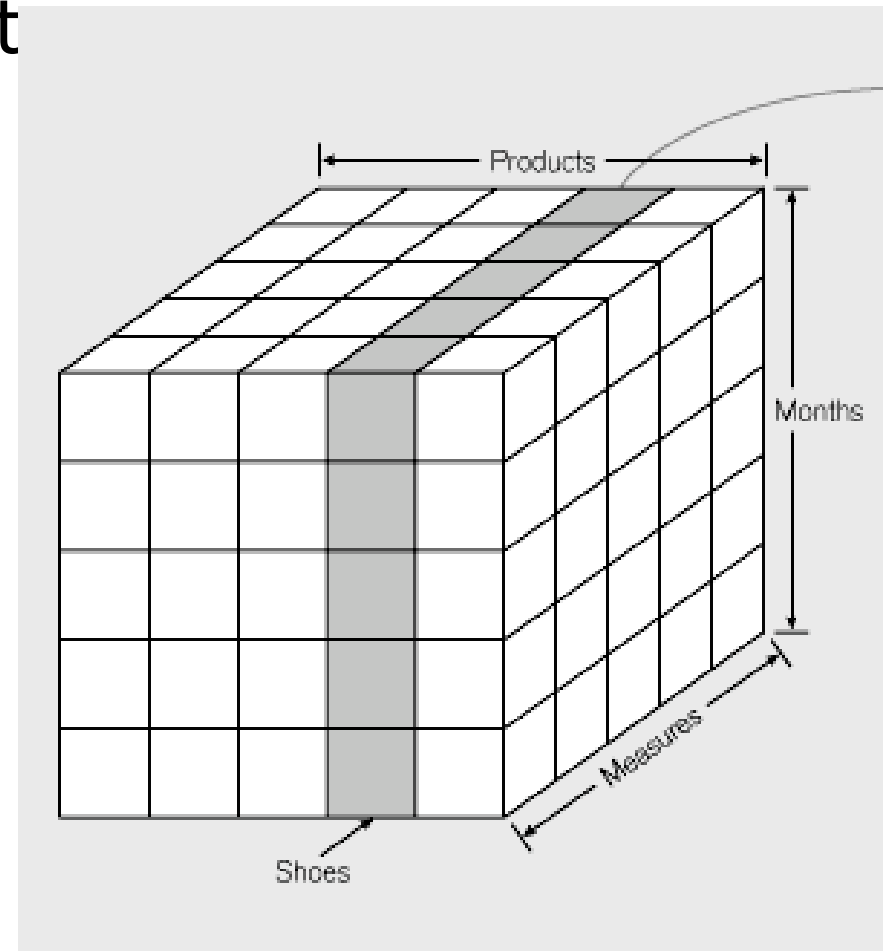
Data cube operations

- OLAP data cube operations:
  - **Dicing** - aggregating "dices" of the cube.
  - **Cube slicing** – come up with (2-D) view of part of data based on restricting the dimensions
  - **Drill-down** – going from summary to more detailed views
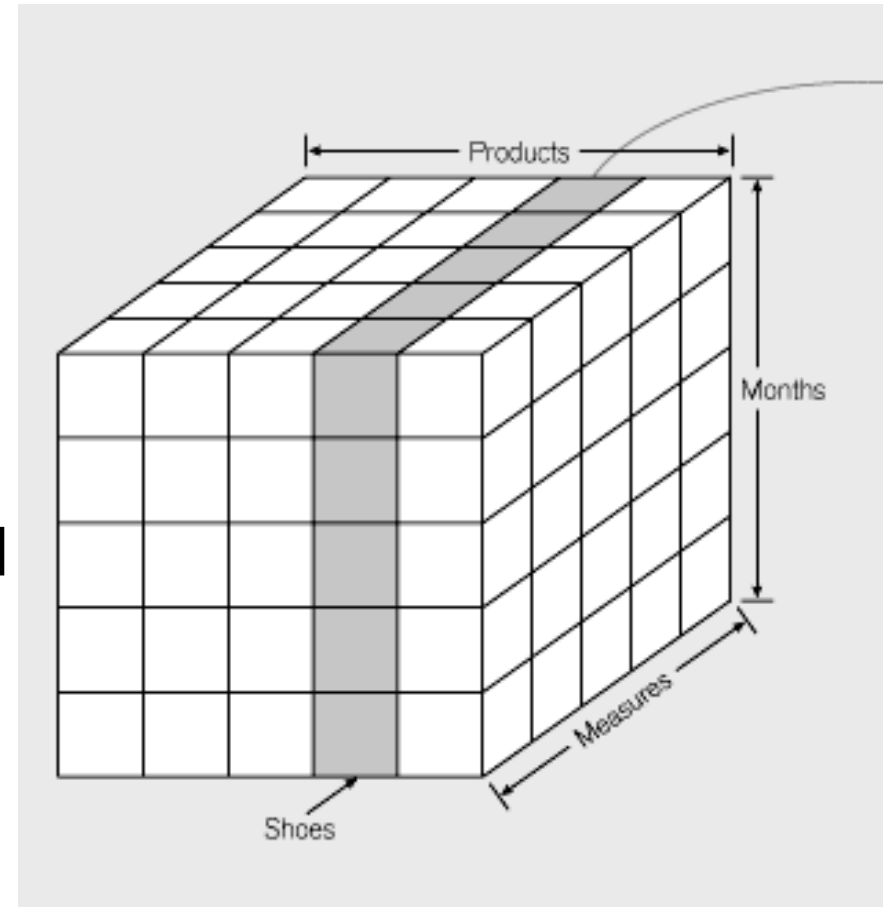 - **Roll-up** – reverse of drill-down

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Figure 11-22: Dicing and slicing a data cube

Products

Months

Measures

Shoes

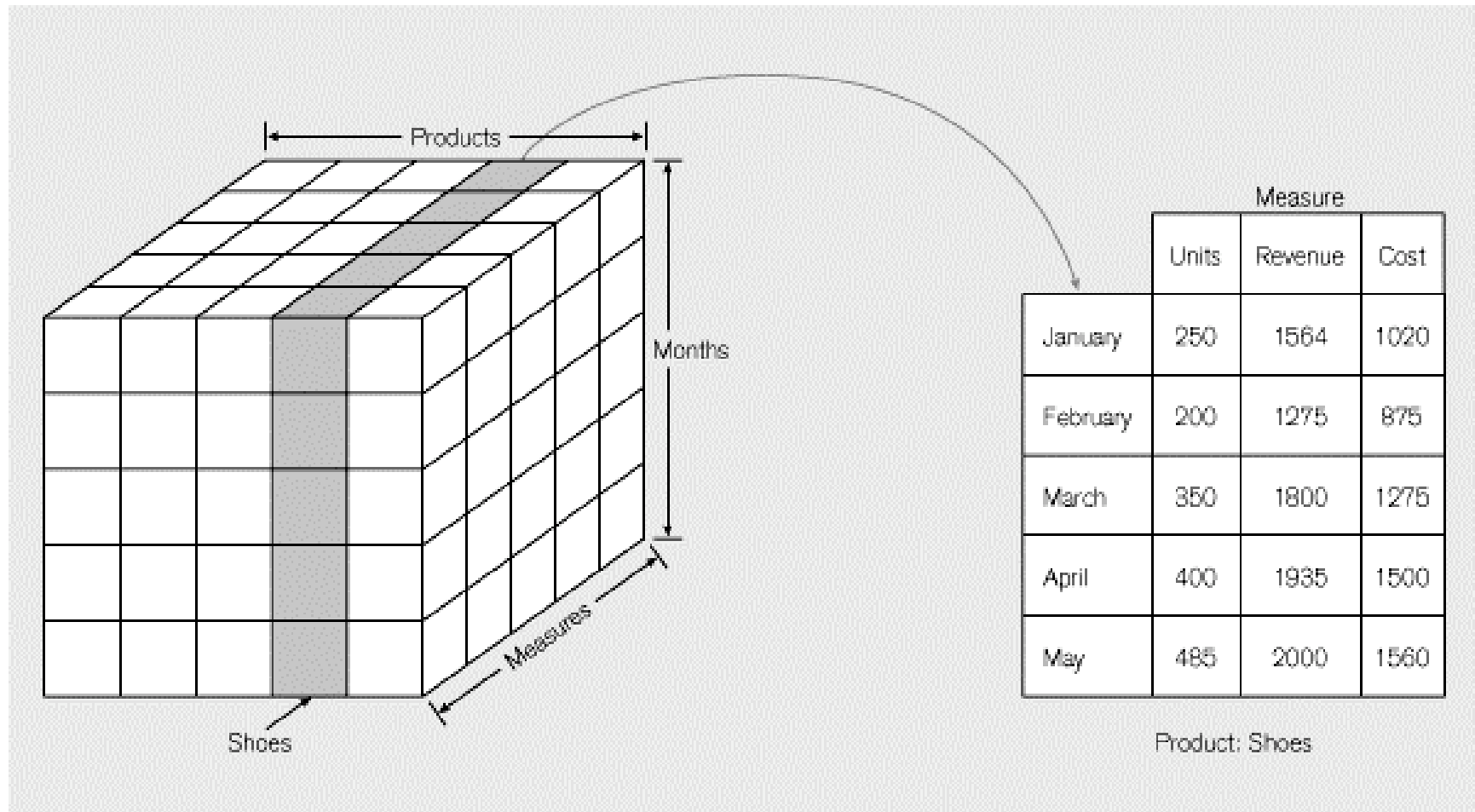|	Measure		
	Units	Revenue	Cost
January	250	1564	1020
February	200	1275	875
March	350	1800	1275
April	400	1935	1500
May	485	2000	1560

Product: Shoes

Figure 11-23:
Example of drill-down

Starting with summary data, users can obtain details for particular cells

Summary report

Brand	Package size	Sales
SofTowel	2-pack	$75
SofTowel	3-pack	$100
SofTowel	6-pack	$50

Drill-down with color added

Brand	Package size	Color	Sales
SofTowel	2-pack	White	$30
SofTowel	2-pack	Yellow	$25
SofTowel	2-pack	Pink	$20
SofTowel	3-pack	White	$50
SofTowel	3-pack	Green	$25
SofTowel	3-pack	Yellow	$25
SofTowel	6-pack	White	$30
SofTowel	6-pack	Yellow	$20

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