



Module 2

Multidimensional data representation and manipulation

Lesson1: Data Cube Concepts

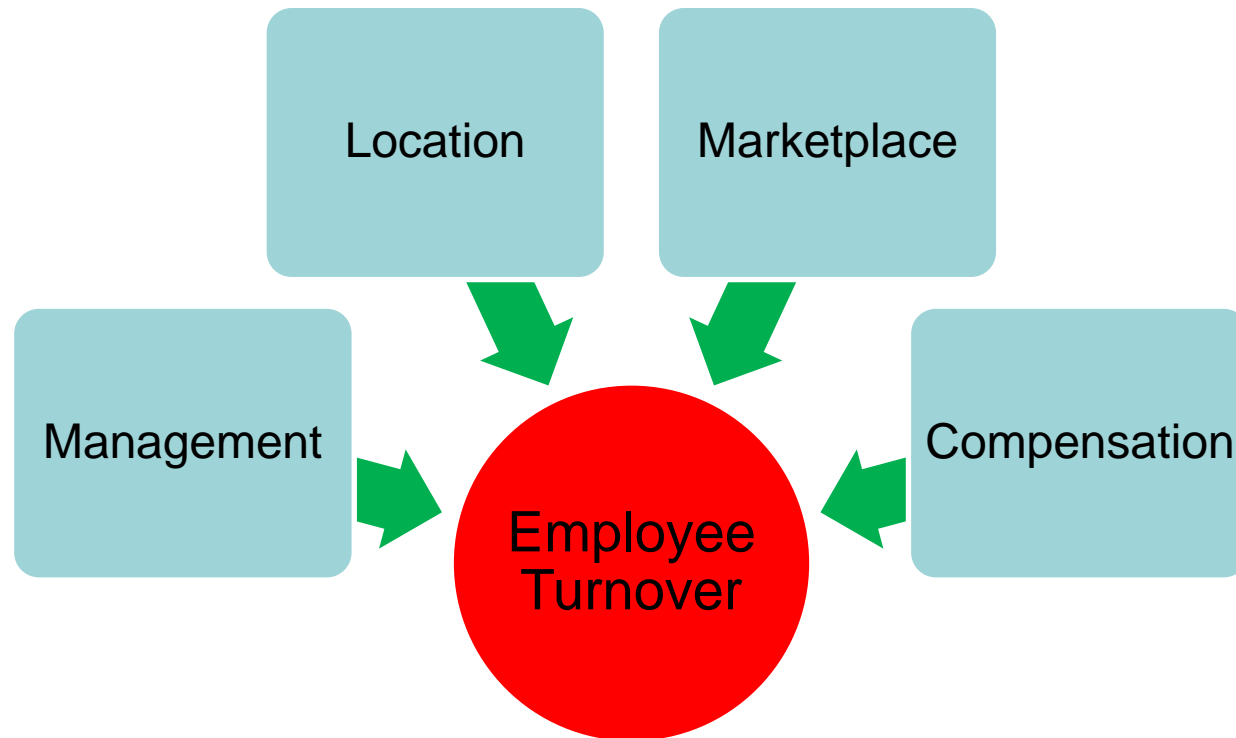


Lesson Objectives

- Discuss business analyst perspective
- Explain reasons for sparsity
- Provide examples of measure aggregation properties



Business Analyst Perspective

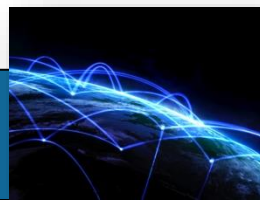
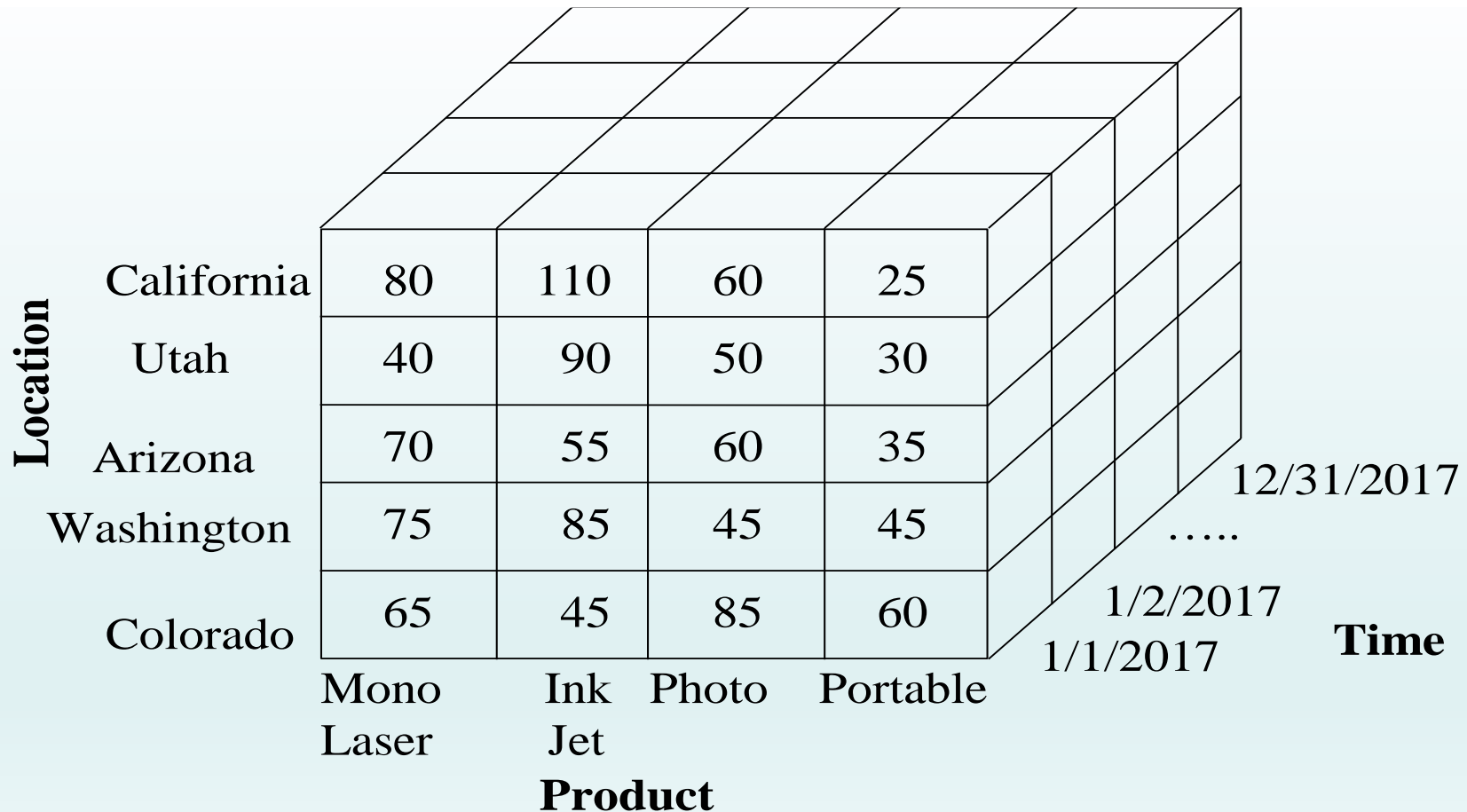


Data Cube Basics

- Business analyst model
 - Factors or influencing variables of interest
 - Quantitative variables
 - Multidimensional arrangement
- Terminology
 - Dimension: subject label for a row or column
 - Member: value of dimension
 - Measure: quantitative variables stored in cells



Sales Data Cube Example



Notes on Dimensions and Measures

- Hierarchical dimensions with sub members
- Sparsity
 - Many cells do not have values
 - Increases with dimension detail and number of dimensions
- Measures
 - Derived measures
 - Multiple measures in cells



Measure Aggregation Properties

- Additive
 - Summarized by addition across all dimensions
 - Common measures such as sales, cost, and profit
- Semi-Additive
 - Summarized by addition in some but not all dimensions such as time
 - Periodic measurements such as account balances and inventory levels
- Non-Additive
 - Cannot be summarized by addition through any dimension
 - Historical facts such as unit price for a sale



Measure Aggregation Example

- Dimensions
 - Course: course id, degree, department, and college
 - Student: student id, major, department, and college
 - Time: semester, academic year, academic decade
- Measures:
 - Credit hours
 - Grade
 - Unit tuition
 - Tuition
- Aggregation properties for measures: ?



Summary

- Business analyst perspective
- Data cubes with dimensions and measures
- Important concepts for design of data warehouse schemas
- Well developed commercial tools for data cube usage

