Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

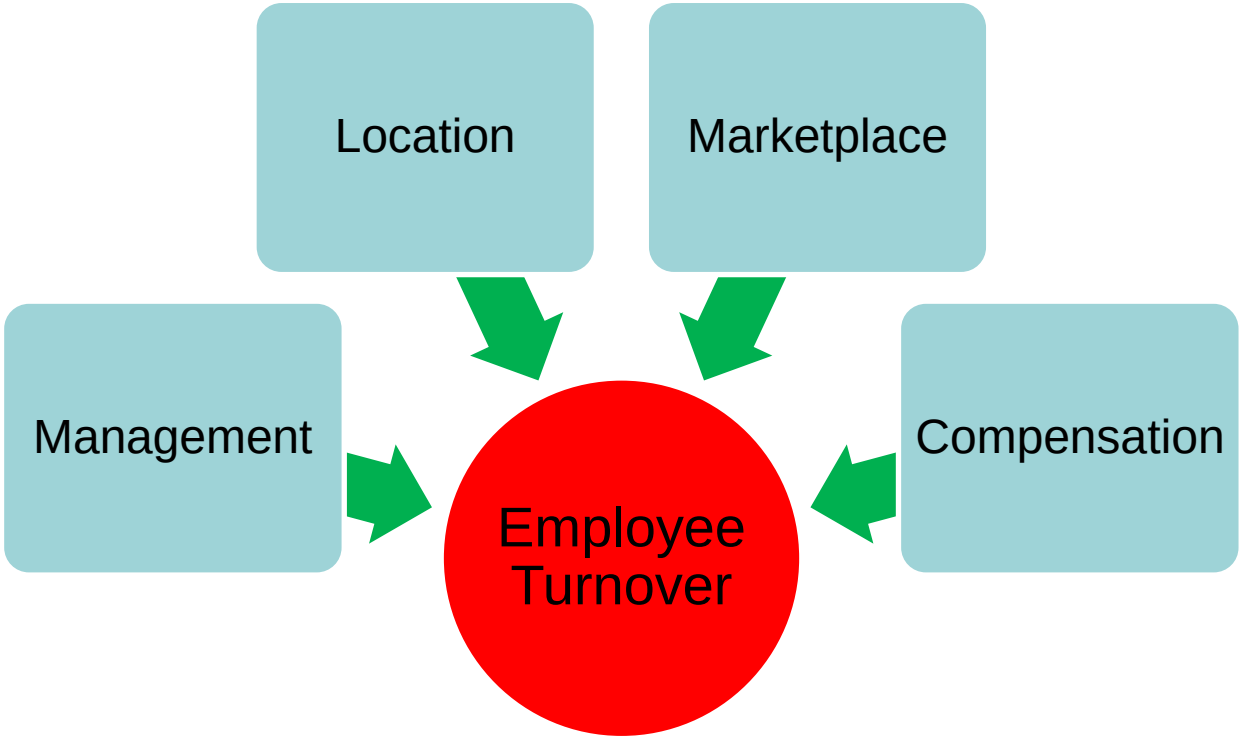
Module 2
Multidimensional data representation and manipulation

Lesson1: Data Cube Concepts

Lesson Objectives

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

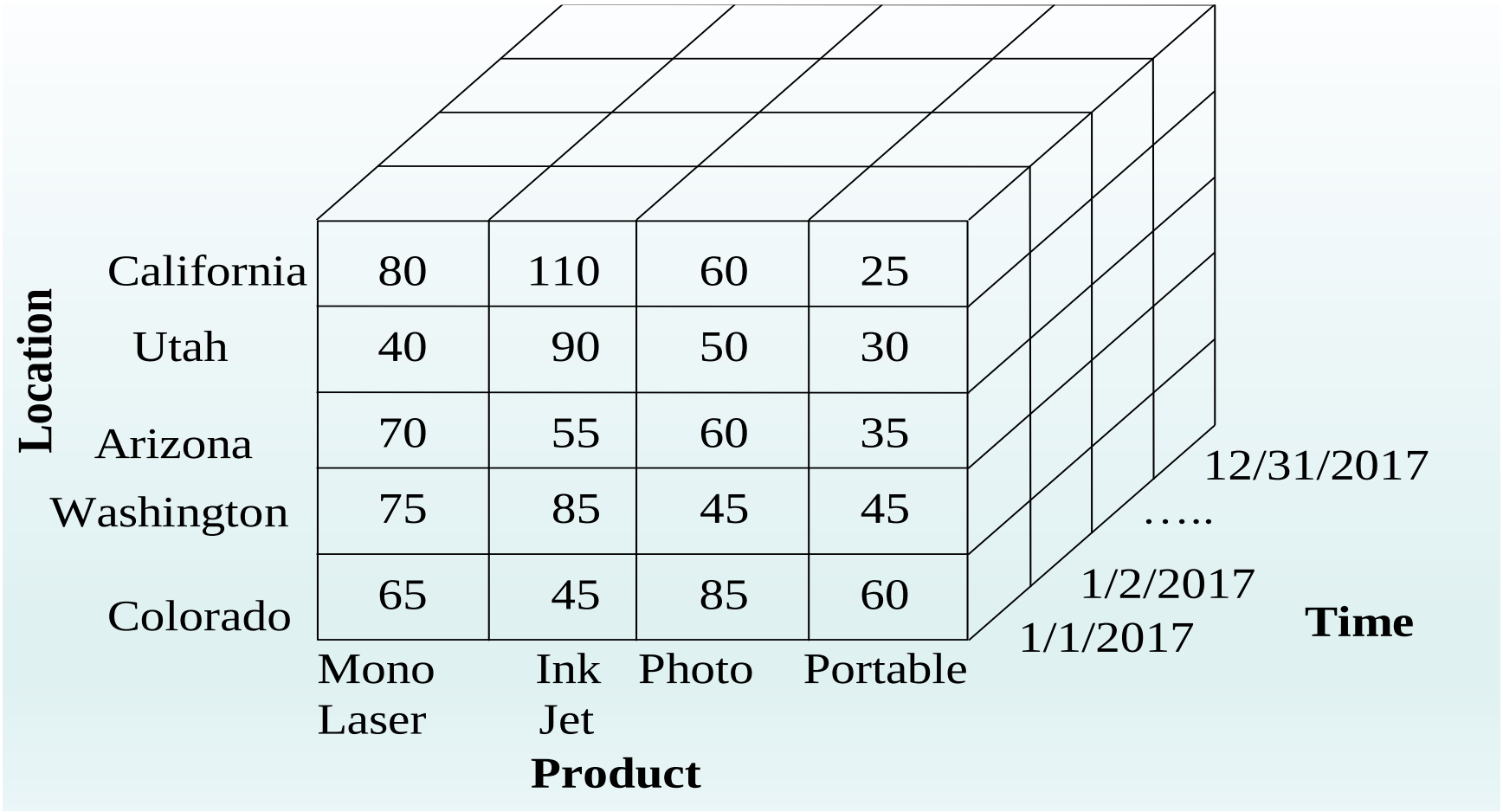
Business Analyst Perspective



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