Making Sense of Analytical Data Structures

Topic
We will review three of the major types of data structures utilized in functional data analysis. We’re looking to highlight the value, limitations, benefits and costs, and provide some high level knowledge about what type of structure might work best for a particular purpose and/or user community.

Presenter
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I have expertise in business intelligence and data warehousing design and development, using both normalized and dimensional data structures, as well as other areas of data management.

Presentation Structure
• Provide a high level overview of three data models: Normalized, Dimensional, and Multidimensional.
• Introduce a higher education training case.
• Look at each data model in more detail and then apply our training case to each model.
• Review the highlights of the presentation.
• Provide some resources for further study.
• Q&A
Overview of Analytic Data Models - Normalized
Overview of Analytic Data Models - Dimensional

**DIMENSION TERM**
- TERM KEY
- TERM CODE
- TERM SHORT DESCRIPTION
- TERM DESCRIPTION
- TERM ACADEMIC YEAR

**FACT UG ADMISSION APPLICATION**
- DATE KEY
- ADMSSN APPL KEY
- ADMSSN APPL CT KEY
- ADMSSN APPL TERM KEY
- ADMITTED COUNT
- MATRICULATED COUNT
- WAITLIST COUNT
- CANCELED COUNT
- CANCEL AFTER ADMIT COUNT

**DIMENSION ADMISSION APPLICANT**
- ADMSSN APCT KEY
- U OF M IDENTIFIER
- UNIQNAME
- NAME
- GENDER CODE
- GENDER DESCRIPTION
- CITIZENSHIP STATUS CODE
- CITIZENSHIP STATUS DESCRIPTION
- RESIDENCY SELF RPT CODE
- RESIDENCY SELF RPT DESCRIPTION
- RESIDENCY OFFICIAL CODE
- RESIDENCY OFFICIAL DESCRIPTION

**DIMENSION DATE**
- DATE KEY
- CALENDAR DATE
- CALENDAR YEAR
- FISCAL YEAR

**DIMENSION ADMISSION APPLICATION**
- ADMSSN APPL NBR
- ADMIT TYPE CODE
- ADMIT TYPE DESCRIPTION
- ACAD LEVEL CODE
- ACAD LEVEL DESCRIPTION
- ACAD CAREER CODE
- ACAD CAREER DESCRIPTION
- ACAD PROGRAM CODE
- ACAD PROGRAM DESCRIPTION
Overview of Analytic Data Models - Multidimensional
A Higher Education Training Case

Goals
• Track and manage application progress (admit, yield, melt); establish and track key milestones; count applications consistently across UM.

Questions
• How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.
• How many applications have been matriculated so far this term for my program? How does this compare to this time last year?
• Have the number of applications being submitted for my program been increasing or decreasing the past five years? Has the ratio of in state/out of state changed during this time period?

Metrics
• Count of pending applications
• Count of admitted applications
• Count of matriculated applications
• Count of applications cancelled after admit
Normalized Model

How Data is Queried
SQL (Business Objects, SQL Developer, Excel, etc.)

Benefits
• Supports data integrity by storing each piece of data only once.
• Generally used for operational/transactional data capture.
• Designed for single row inquiry.
• Stores the raw data.
• Flexible; allows users to define their own metrics.

Costs
• Requires multiple tables joins to support reporting (i.e. retrieving the description for a code).
• Generally more difficult to use for reporting and analytics.
• Not optimized for summarization/aggregation. Query times can be longer when summarizing lots of data.
• Data’s functional rules are not stored in the database.
• Requires more data knowledge and technical skills.
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
**Question**

How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

**Query**

```sql
SELECT COUNT(DISTINCT(CASE WHEN PG.PROG_STATUS = 'CN' AND PG.PROG_ACTION IN ('WAPP', 'WADM')...```

**Cancelled after Admit Apps**

Include:
- CN WAPP
- CN WADM

Exclude:
- True Revocations*
- CN WAPP OTHR
- CN WAPP REQ
- CN WAPP TERM
- CN WAPP UNIT
- CN WAPP PRGC
- CN WADM AUD
- CN WADM CON
- CN WADM FALS
- CN WADM FEES
- CN WADM INCO
- CN WADM LATE
- CN WADM NDEC
- CN WADM OTHR
- CN WADM TYPE
**Normalized Model Applied to the Training Case**

**Question**
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

**Query**

```sql
SELECT COUNT(DISTINCT(CASE WHEN PG.PROG_STATUS = 'CN'
                         AND PG.PROG_ACTION IN ('WAPP', 'WADM')
                         AND NOT (PG.PROG_STATUS = 'CN'
                         AND PG.PROG_ACTION = 'WAPP'
                         AND PG.PROG_REASON = 'OTH'))
                         AND NOT (PG.PROG_STATUS = 'CN'
                         AND PG.PROG_ACTION = 'WAPP'
                         AND PG.PROG_REASON = 'REQ')
                         AND NOT (PG.PROG_STATUS = 'CN'
                         AND PG.PROG_ACTION = 'WAPP'
                         AND PG.PROG_REASON = 'OTHR')
                         AND NOT (PG.PROG_STATUS = 'CN'
                         AND PG.PROG_ACTION = 'WAPP'
                         AND PG.PROG_REASON = 'REQ')
                         ... THEN PG.ADM_APPL_NBR
                         END)) as "CANCELLED_AFTER_ADMIT"
```
Normalized Model Applied to the Training Case

**Question**
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

**Query**

```sql
SELECT COUNT(DISTINCT(CASE
  WHEN PG.PROG_STATUS = 'CN'
  AND PG.PROG_ACTION IN ('WAPP', 'WADM')
  AND NOT (PG.PROG_STATUS = 'CN'
    AND PG.PROG_ACTION = 'WAPP'
    AND PG.PROG_REASON = 'OTHR')
  AND NOT (PG.PROG_STATUS = 'CN'
    AND PG.PROG_ACTION = 'WAPP'
    AND PG.PROG_REASON = 'REQ')
  ... THEN PG.ADM_APPL_NBR
END)) as "CANCELLED_AFTER_ADMIT"
FROM ADM_APPL_PROG PG
```
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT COUNT(DISTINCT(CASE
  WHEN PG.PROG_STATUS = 'CN'
    AND PG.PROG_ACTION IN ('WAPP','WADM')
    AND NOT (PG.PROG_STATUS = 'CN'
      AND PG.PROG_ACTION = 'WAPP'
      AND PG.PROG_REASON = 'OTHR')
    AND NOT (PG.PROG_STATUS = 'CN'
      AND PG.PROG_ACTION = 'WAPP'
      AND PG.PROG_REASON = 'REQ')
  ... THEN PG.ADM_APPL_NBR
END)) as "CANCELLED_AFTER_ADMIT"
FROM ADM_APPL_PROG PG
WHERE PG.ACAD_PROG = '00167'
AND PG.ADMIT_TERM = '1810'
Normalized Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT COUNT(DISTINCT(CASE WHEN PG.PROG_STATUS = 'CN' AND PG.PROG_ACTION IN ('WAPP', 'WADM') AND NOT (PG.PROG_STATUS = 'CN' AND PG.PROG_ACTION = 'WAPP' AND PG.PROG_REASON = 'OTHR') AND NOT (PG.PROG_STATUS = 'CN' AND PG.PROG_ACTION = 'WAPP' AND PG.PROG_REASON = 'REQ') ... THEN PG.ADM_APPL_NBR END)) as "CANCELLED_AFTER_ADMIT"
FROM ADM_APPL_PROG PG
WHERE PG.ACAD_PROG = '00167'
AND PG.ADMIT_TERM = '1810'
Normalized Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
WHERE PG.ACAD_PROG = '00167'
AND PG.ADMIT_TERM = '1810'
AND PG.ADM_APPL_PROG_EFFDT =
(SELECT MAX(A.ADM_APPL_PROG_EFFDT)
FROM ADM_APPL_PROG A
WHERE A.EMPLID = PG.EMPLID
AND A.ACAD_CAREER = PG.ACAD_CAREER
AND A.STDNT_CAR_NBR = PG.STDNT_CAR_NBR
AND A.ADM_APPL_NBR = PG.ADM_APPL_NBR
AND A.APPL_PROG_NBR = PG.APPL_PROG_NBR
AND A.ADM_APPL_PROG_EFFDT <= '2011-04-27')
Normalized Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
WHERE PG.ACAD_PROG = '00167'
AND PG.ADMIT_TERM = '1810'

AND PG.ADM_APPL_PROG_EFFDT = (SELECT MAX(A.ADM_APPL_PROG_EFFDT)
FROM ADM_APPL_PROG A
WHERE A.EMPLID = PG.EMPLID
AND A.ACAD_CAREER = PG.ACAD_CAREER
AND A.STDNT_CAR_NBR = PG.STDNT_CAR_NBR
AND A.ADM_APPL_NBR = PG.ADM_APPL_NBR
AND A.APPL_PROG_NBR = PG.APPL_PROG_NBR
AND A.ADM_APPL_PROG_EFFDT <= '2011-04-27')

AND PG.ADM_APPL_PROG_EFFSEQ = (SELECT MAX(A.ADM_APPL_PROG_EFFSEQ)
FROM ADM_APPL_PROG A
WHERE A.EMPLID = PG.EMPLID
AND A.ACAD_CAREER = PG.ACAD_CAREER
AND A.STDNT_CAR_NBR = PG.STDNT_CAR_NBR
AND A.ADM_APPL_NBR = PG.ADM_APPL_NBR
AND A.APPL_PROG_NBR = PG.APPL_PROG_NBR
AND A.ADM_APPL_PROG_EFFDT <= PG.ADM_APPL_PROG_EFF_DT)
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
WHERE PG.ACAD_PROG = '00167'
AND PG.ADMIT_TERM = '1810'
AND PG.ADM_APPL_PROG_EFFDT = 
(SELECT MAX(A.ADM_APPL_PROG_EFFDT)
FROM ADM_APPL_PROG A
WHERE A.EMPLID = PG.EMPLID
AND A.ACAD_CAREER = PG.ACAD_CAREER
AND A.STDNT_CAR_NBR = PG.STDNT_CAR_NBR
AND A.ADM_APPL_NBR = PG.ADM_APPL_NBR
AND A.APPL_PROG_NBR = PG.APPL_PROG_NBR
AND A.ADM_APPL_PROG_EFFDT <= '2011-04-27')
AND PG.ADM_APPL_PROG_EFFSEQ = 
(SELECT MAX(A.ADM_APPL_PROG_EFFSEQ)
FROM ADM_APPL_PROG A
WHERE A.EMPLID = PG.EMPLID
AND A.ACAD_CAREER = PG.ACAD_CAREER
AND A.STDNT_CAR_NBR = PG.STDNT_CAR_NBR
AND A.ADM_APPL_NBR = PG.ADM_APPL_NBR
AND A.APPL_PROG_NBR = PG.APPL_PROG_NBR
AND A.ADM_APPL_PROG_EFFDT <= PG.ADM_APPL_PROG_EFF_DT)
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
Normalized Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
,PERSONAL_DATA PD

WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
AND AD.EMPLID = PD.EMPLID
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
,PERSONAL_DATA PD
,RESIDENCY_OFF RO
WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
AND AD.EMPLID = PD.EMPLID
AND PD.EMPLID = RO.EMPLID
Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
,PERSONAL_DATA PD
,RESIDENCY_OFF RO
,RESIDENCY RD

WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
AND AD.EMPLID = PD.EMPLID
AND PD.EMPLID = RO.EMPLID
AND RO.EMPLID = RD.EMPLID
Normalized Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
,PERSONAL_DATA PD
,RESIDENCY_OFF RO
,RESIDENCY RD

WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
AND AD.EMPLID = PD.EMPLID
AND PD.EMPLID = RO.EMPLID
AND RO.EMPLID = RD.EMPLID
Normalized Model Applied to the Training Case

**Question**
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

**Query**
FROM ADM_APPL_PROG PG
,ADM_APPL_DATA AD
,PERSONAL_DATA PD
,RESIDENCY_OFF RO
,RESIDENCY RD

WHERE PG.EMPLID = AD.EMPLID
AND PG.ACAD_CAREER = AD.ACAD_CAREER
AND PG.STDNT_CAR_NBR = AD.STDNT_CAR_NBR
AND PG.ADM_APPL_NBR = AD.ADM_APPL_NBR
AND AD.EMPLID = PD.EMPLID
AND PD.EMPLID = RO.EMPLID
AND RO.EMPLID = RD.EMPLID
Dimensional Model

How Data is Queried
SQL (Business Objects, SQL Developer, Excel, etc.)

Benefits
• Ease of use. Turning data into information is less complex for the end user.
• Common definitions of measures.
• Typically faster end user query performance.
• Simplistic model layout. Facts in the middle with dimensions all around.
• Fewer and more simplistic join paths.

Costs
• Data is limited to the process or domain being modeled.
• Users must be able to agree and document the definitions of the measures. New measures may require changes to the data model.
• Complex transformation processes required.
• Requirements and rules need to be identified and clearly articulated during the design and development process.
• Complex design and transformation processes required.
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT)
FROM FACT_UG_ADMISSION_APPLICATION FC
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT)
FROM FACT_UG_ADMISSION_APPLICATION FC
, DIMENSION_ADMISSION_APPLICATION AP
WHERE AP.ACAD_PROGRAM_CODE = '00167'
AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
Dimensional Model Applied to the Training Case

Question

How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query

```
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT)
FROM FACT_UG_ADMISSION_APPLICATION FC
, DIMENSION_ADMISSION_APPLICATION AP
, DIMENSION_TERM TM
WHERE AP.ACAD_PROGRAM_CODE = '00167'
AND TM.TERM_CODE = '1810'
AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
AND TM.TERM_KEY = FC.TERM_KEY
```
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT)
FROM FACT_UG_ADMISSION_APPLICATION FC , DIMENSION_ADMISSION_APPLICATION AP , DIMENSION_TERM TM , DIMENSION_DATE DT
WHERE AP.ACAD_PROGRAM_CODE = '00167'
AND TM.TERM_CODE = '1810'
AND DT.CALENDAR_DATE = '2011-04-27'
AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
AND TM.TERM_KEY = FC.TERM_KEY
AND DT.DATE_KEY = FC.DATE_KEY
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT), AC.RESIDENCY_OFFICIAL_CODE,
       AC.GENDER_CODE
FROM FACT_UG_ADMISSION_APPLICATION FC,
     DIMENSION_ADMISSION_APPLICATION AP,
     DIMENSION_TERM TM,
     DIMENSION_DATE DT,
     DIMENSION_ADMISSION_APPLICANT
WHERE AP.ACAD_PROGRAM_CODE = '00167'
  AND TM.TERM_CODE = '1810'
  AND DT.CALENDAR_DATE = '2011-04-27'
  AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
  AND TM.TERM_KEY = FC.TERM_KEY
  AND DT.DATE_KEY = FC.DATE_KEY
  AC.ADMSSN_APCT_KEY = FC.ADMSSN_APCT_KEY
GROUP BY AC.RESIDENCY_OFFICIAL_CODE,
       AC.GENDER_CODE
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query

```
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT), AC.RESIDENCY_OFFICIAL_CODE, AC.GENDER_CODE, AP.APPL_ADMIT_TYPE_DESCRIPTION
FROM FACT_UG_ADMISSION_APPLICATION FC,
     DIMENSION_ADMISSION_APPLICATION AP,
     DIMENSION_TERM TM,
     DIMENSION_DATE DT,
     DIMENSION_ADMISSION_APPLICANT AC
WHERE AP.ACAD_PROGRAM_CODE = '00167'
AND TM.TERM_CODE = '1810'
AND DT.CALENDAR_DATE = '2011-04-27'
AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
AND TM.TERM_KEY = FC.TERM_KEY
AND DT.DATE_KEY = FC.DATE_KEY
AC.ADMSSN_APCT_KEY = FC.ADMSSN_APCT_KEY
GROUP BY AC.RESIDENCY_OFFICIAL_CODE, AC.GENDER_CODE, AP.APPL_ADMIT_TYPE_DESCRIPTION
```
Dimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT SUM (FC.CANCEL_AFTER_ADMIT_COUNT), AC.RESIDENCY_OFFICIAL_CODE, AC.GENDER_CODE, AP.APPL_ADMIT_TYPE_DESCRIPTION
FROM FACT_UG_ADMISSION_APPLICATION FC
, DIMENSION_ADMISSION_APPLICATION AP
, DIMENSION_TERM TM
, DIMENSION_DATE DT
, DIMENSION_ADMISSION_APPLICANT
WHERE AP.ACAD_PROGRAM_CODE = '00167'
AND TM.TERM_CODE = '1810'
AND DT.CALENDAR_DATE = '2011-04-27'
AND AP.ADMSSN_APPL_KEY = FC.ADMSSN_APPL_KEY
AND TM.TERM_KEY = FC.TERM_KEY
AND DT.DATE_KEY = FC.DATE_KEY
AC.ADMSSN_APCT_KEY = FC.ADMSSN_APCT_KEY
GROUP BY AC.RESIDENCY_OFFICIAL_CODE, AC.GENDER_CODE, AP.APPL_ADMIT_TYPE_DESCRIPTION
**Multidimensional Model**

**How Data is Queried**
MDX (Tableau, Excel, Voyager, SSRS, etc.)

**Benefits**
- Ease of use. Turning data into information is less complex for the end user. The model is optimized for pre-defined measures.
- Typically faster end user query performance.
- Dimension comparison and analysis is easier (i.e. Time, organizational group, etc.).
- Simulates the functionality of a pivot table in Excel.

**Costs**
- Another object to maintain.
- Additional processing and storage requirements.
- Users must be able to agree and document the hierarchies, groups, etc.
- The data is organized differently than conventional data structures.
Multidimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT [Measures].[Count of Cancelled Applications] ON COLUMN FROM [ApplicationCount]
Multidimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT [Measures].[Count of Cancelled Applications] ON COLUMN
FROM [ApplicationCount]
WHERE ([Application].[Academic Program Code].&[00167]
Multidimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT [Measures].[Count of Cancelled Applications] ON COLUMN FROM [ApplicationCount]
WHERE ([Application].[Academic Program Code].&[00167], [Term].[Term Code].&[1810])

FROM [ApplicationCount]
Multidimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type.

Query
SELECT [Measures].[Count of Cancelled Applications] ON COLUMN
FROM [ApplicationCount]
WHERE ([Application].[Academic Program Code].&[00167], [Term].[Term Code].&[1810], [Date].[Calendar Date].&[2011-04-27])
Multidimensional Model Applied to the Training Case

Question
How many applications have been cancelled after being admitted for my program this term as of today? I want to be able to pivot the data by residency, gender and admit type. The “cube” is not really a cube because it can be n-dimensional! But we only have three dimensions in which to draw.

Query
SELECT [Measures].[Count of Cancelled Applications] ON COLUMN
,([Applicant].[Residency]
, [Applicant].[Gender]
, [Application].[Admit Type]) ON ROW
FROM [ApplicationCount]
WHERE ([Application].[Academic Program Code].&[00167]
, [Term].[Term Code].&[1810]
, [Date].[Calendar Date].&[2011-04-27]
**Review**

**Normalized Model**
Normalized models organize and store data into its most elemental (atomic) form. Data is stored only once.

**Dimensional Model**
Dimensional models organize data into dimensions and measures to support reporting.

**Multidimensional Model**
Multidimensional models are built to simplify comparison and analysis (i.e. Time, organizational group, etc.)
Resources

Books
• Data Modeling Made Simple: A Practical Guide for Business & Information Technology Professionals  Steve Hoberman
• The Data Warehouse Toolkit (The Complete Guide to Dimensional Modeling)  Ralph Kimball, Margy Ross

Websites
• www.ralphkimball.com
• www.tdwi.org

ITS Resources
bi.inform@umich.edu
Questions?