**Problem 3**

The most detailed grain is the combination of individual product or service, individual customer, and date (for special events, only customer and date).

* 50000 members: sum of member rows
* 350 franchises: sum of franchises
* 450,000 items sold merchandises (Contains rows) per year
* 500 Unique merchandise items
* 100,000 ServicePurchase rows per year
* 20 Unique ServCategory rows
* 300 SpecialEvents Worksheet rows per year per franchise with 200 franchises using this spreadsheet
* 150 unique customers per special event worksheet
* Merchandise Product sales(item level): 450,000
* Days per year: 365
* Customer number (product) = 50000
* Customer number (service) = 50000
* Customer number (special event) = 200\*150=30000
* Fact table size (merchandize product sales) is determined - 450000 purchases per year (including merchandise product)
* Fact table size (service sales) is determined - 100000 purchases per year (including service)
* Fact table size (special event sales) is determined - 300\*200=60000 purchases per year (including special events)
* Sparsity estimate:
  + 1 - ( fact table size / product of dimensions )
  + (1 – ( 450000 / (500\*50000\*365) ) = 0.9995
  + The data cube has mostly missing cells with slightly more than 0.0005% of cells with non-zero values.
  + 1 - ( fact table size / service of dimensions )
  + (1 – ( 100000 / (20\*50000\*365) ) = 0.997
  + The data cube has mostly missing cells with slightly more than 0.003% of cells with non-zero values.
  + 1 - ( fact table size / special events of dimensions )
  + (1 – ( 60000 / (30000\*365) ) = 0.995
  + The data cube has mostly missing cells with slightly more than 0.005% of cells with non-zero values.