3. The smallest grain necessitated by the business requirements is the combination of customers, calendar dates and products.

      a. Customers are the sum of members, corporate customers, and a default value for anonymous customers: $50,000 + (150 * 200) + 1 = 80,001$

      b. Calendar: statistics are per year (365 days)

      c. Products are the sum of merchandise, services and a default value for events: $500 + 20 + 1 = 521$

      d. The number of rows in the fact table are determined by the sum of merchandise sales, services and event sales : $150,000 + 100,000 + (300 * 200) = 310,000$

      e. Sparsity: $1 - (310,000 / (80,001 * 365 * 521) = 0.99997962321372$