Introduction to Databases

I. Overview and logistics (p.1-2)

II. The Israeli Bank and its Data (p. 3-9)

III. SEEstat (p. 10-15)

IV. Interesting Scenarios (p. 16-22)

V. Homework 1 (p. 23)
Logistics for Recitation and HW

• TA
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• Recitation: Monday 11:30-12:30
  Thursday 15:30-16:30

• Course website: http://ie.technion.ac.il/serveng2014S
Call Center of a Small Israeli Bank

• Extensively used in Homeworks

• General Data
  o 12 months in 1999
  o 13 regular agents, 5 Internet agents, 1 shift-supervisor
    • Working hours: Sun-Thurs, 7am-midnight; Fri 7am-2pm; Sat 8pm-midnight
  o Approximately 100,000–120,000 calls per month
  o Call records
    • Time stamps: VRU, queue, service
    • Service Types: PS (68%) Routine Services; NE (9%) Stock Transaction; NW (15%) New/potential Customers; IN (5%) Internet Assistance; TT (3%) outbound; PE (0.5%) Foreign Language (English)
    • Customer Types: Regular and VIP
Event History of an Incoming Call

- VRU/IVR: Voice Response Unit / Interactive Voice Response
- Units of rates are calls per month
# A Data Sample (Automated Call Distributor)

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Number of Calls:

**Annual Plot with Month as time unit**

- Decrease in calls in Apr and Sep
  - Due to many holidays in these months
  - Affects staffing and hiring/training schedules

- Number of calls per type
  - **IN:** Internet assistance
  - **NE:** Stock transaction
  - **NW:** New/potential customers
Number of Calls: Monthly and Daily Plots

- Calls per day in November
  - Daily resolution
  - Valleys in weekends
  - Used to determine work assignments

- Calls per hour: Weekdays in Nov-Dec
  - Hourly resolution
  - Two peaks at 10AM and 3PM
Number of Calls: 12 Monthly Plots
Debugging Database

- Combinations of VRU, queue and service times

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Project DataMOCCA/SEEStat

- **Data MOdel**s for **Call Center** **Analysis**
- **Service Enterprise Engineering Statistics**

- Project Partners: Technion, Wharton, Companies

- Goal: Designing and Implementing a (universal) data-base/data-repository and interface for storing, retrieving, analyzing and displaying Call-by-Call-based data/information

- Enables the Study of:
  - **Customers**: Wait Time, Abandonment, Retrials
  - **Service Providers/Agents**: Service Duration, Activity Profile
  - **Managers/System**: Loads, Queue Lengths, Trends
SEEStat Interface (Recitation 6)

• [http://seeserver.iem.technion.ac.il/see-terminal](http://seeserver.iem.technion.ac.il/see-terminal)
SEESStat

• System Components:
  o **Cleaned data**: operational histories of individual calls - export, import
  o **Daily / monthly / yearly reports and flow-charts** for a complete operational view
  o **Graphs and tables**
    • in customized resolutions (**month, days, hours, minutes, seconds**)
    • for a variety of (pre-designed) operational measures (arrival rates, abandonment counts, service- and wait-time distribution, utilization profiles,...), and for **new user-defined measures**

• Currently Four Databases (some public, some for research):
  o **US Bank** (220/40M calls, 1000 agents, 2.5 years).
  o **Israeli Telecom** (800 agents, 3.5 years; 55GB; ongoing).
  o **Israeli Bank** (500 agents, 1.5 years; ongoing).
  o **Hospital** (from 7 hospitals, 1-4 years, different levels of information)
SEEStat: Flow Chart


- VRU: 3760
- Announce: 28968
  - 2895
  - 28968
- Message: 84645
  - 42542
- Direct: 10394
  - 42103
  - 4247
- Offered Volume: 48240
  - 4247
  - 3716
  - 44
  - 15
  - 10394
- Handled: 9130
  - 37723
  - 3716
  - 37723
- Disconnect: 1387
  - 37723
- Entries
- Exits (Good)
- Abandonment (Bad)
Pre-designed Operational Measures: Arrival Rates, Feb 2005

Daily Reports

![Graph showing operational measures for Feb 2005]
Pre-designed Operational Measures: Service Times

Histograms

Customer service time Private Caller Termination
February 2005, Week days
Service Eng: Interesting Scenarios (2)

Israeli Bank: Histogram of Waiting Time

Wait time (handled)
ILBank, January 2006, Week days

Relative frequencies %

Time (Resolution 1 sec.)

00:12 01:12 02:12 03:12 04:12 05:12 06:12 07:12 08:12
Service Eng: Interesting Scenarios (3)

Hospital Data: Histogram of Length of Stay
US Bank: Arrival Rates on Tuesdays in September
Unhandled Calls on May 24th, 2005

Agents Status on May 24th, 2005
Service Eng: Interesting Scenarios (6)

Psychology + Protocols

[Graph showing data analysis]
Future features in SEEStat – Daily report, customer flows within the IVR
Homework 1

- 3 parts
- Due next lecture (24/10/2013).
- All related materials can be found under the course website: http://ie.technion.ac.il/serveng2014W