Announcements on April 9

- Schedule
  - 4/04: Bounds
    - Read MU Chapter 3.3, 4.2
  - 4/09: Selection & Other App., **Quiz**
    - You are allowed to bring one A4 sized reference note (Original, handwritten)
    - Read MU 3.4, 4.2, 4.3
    - **HW: Chapter3 – 2, 3, 6, 9, 16, 22, 25**
    - **Chapter 4 – 1, 2, 3, 5, 6, 9, 12**
  - 4/11: BB Model
    - Read MU 5
  - 4/13: **Supp Class(7:00PM)**, BB Model
    - Read MU 5

Announcements on April 11

- Schedule
  - 4/09: Selection & Other App., **Quiz**
    - You are allowed to bring one A4 sized reference note (Original, handwritten)
    - Read MU 3.4, 4.2, 4.3
    - **HW: Chapter3 – 2, 3, 6, 9, 16, 22, 25**
    - **Chapter 4 – 1, 2, 3, 5, 6, 9, 12**
  - 4/11: Selection, BB Model
    - Read MU 5
  - 4/13: **Supp Class(7:00PM)**, BB Model
    - Read MU 5

Announcements on April 13

- Schedule
  - 4/11: Selection
    - Read MU 5
  - 4/13: BB Model
    - Read MU 5
    - **HW: Chapter 4 – 2, 4, 5, 9, 11, 17, 20**
  - 4/16: BB Model
    - Read MU 5

Load Balancing

- Load balancing is one of important topics in Computer Science
  - Examples
    - Allocate Jobs to CPUs
    - Assign search requests to (google) servers
    - Distribute requests to YouTube servers
    - CDNs and „„

- There are several clever load balancing algorithms such as shortest queue first
- Random allocation works surprisingly good

Load Balancing

- Random allocation can be modeled as the **Balls into Bins** model
  - Ball: Video requests, m requests
  - Bin: YouTube server, n servers
  - For example, m= 10^6, n=10^3

Refer to MU Exercise 4.17

- On average, m/n requests are allocated to each YouTube server

- Let X_i = # requests allocated to the i-th server
  - X_i~B(m, 1/n)
    - E[X_i]=m/n, Var[X_i]=m(n-1)/n^2 ≈ m/n
  - Applying Chernoff bound (Corollary 4.6), we can prove that with high probability $X_i \leq \frac{m}{n} + 3\sqrt{(\mathrm{m/n}) \cdot \ln m}$

About 250

Announcements on April 16

- Schedule
  - 4/13: BB Model
    - Read MU 5
    - **HW: Chapter 4 – 2, 4, 5, 9, 11, 17, 20**
  - 4/16: BB Model Examples
    - Read MU 5
  - 4/18: BB Models Examples
    - Read MU 5

How to manage password database?

- Several reports on personal information databases
  - 2013 Adobe
  - SKT, KT, LG U+
  - Auction, Interpark, …
  - NH
- People tend to use same IDs and passwords in different sites
- Leak in one system requires changes in many other systems
- Both inside and outside attackers

  ➔ Should not trust anyone
- Naïve approach

Ann	Ann Tylor	Tylor0721
Beeth	Beth Smith	seattle#97012
Cheese	Mike Chenny	password

Hashed Password

Regression Toward the Mean

- Average heights of Female & Male are 160 & 170, respectively
- Consider a couple whose heights are 170 (wife) and 180 (husband)
- The couple has a girl (or a boy). What do you expect her height?
  - More than 170?
  - More than 160?
  - Less than 160?