**Y.C. Tay: 3 Projects**

**database**

*target:* replace TPC benchmarks 

*bad* 

not application-specific

*idea:* empirical (application) dataset 

done

synthetically scale to desired size

current work

*collaborative framework* for tools to tweak data 

from developer community

**memory**

*target:* a scientific analysis of recency (LRU) vs popularity in cache replacement policies

*idea:* use my Cache Miss Equation

\[
\text{Prob(miss)} = \frac{1}{2} (K + \sqrt{K^2 - 4}) (P^* + P_0) - P_0
\]

where \( K = 1 + \frac{M^* - M_0}{M - M_0} \)

analyze and interpret how recency/popularity affects \( M^*, M_0, P^*, P_0 \)

**networking**

*target:* a paradigm shift in congestion control from packet loss to bandwidth-delay product

\( N_{\text{BDP}} = B_{\text{max}} R_{\text{min}} \)

Over 2015-17, Google shifted production traffic from TCP CUBIC (loss-based) to BBR (\( N_{\text{BDP}} \)-based) using probes to estimate \( B_{\text{max}} \) and \( R_{\text{min}} \)

*idea:* use queueing formula

\[
X = \frac{N}{R_{\text{min}} + \frac{N}{B_{\text{max}}}}
\]

regression+extrapolation (no probes)

works for *any* TCP version

works for *video games*