

Carnegie Mellon Univ.
Dept. of Computer Science
15-415/615 - DB Applications

C. Faloutsos – A. Pavlo
Lecture#27: Final Review

Administrivia – Final Exam

- **Who:** You
- **What:** <http://cmudb.io/s15-final>
- **When:** Monday May 11th 5:30pm- 8:30pm
- **Where:** GHC 4401
- **Why:** You lost all your money betting on the Mayweather vs. Pacquiao fight.

Administrivia – Final Exam

- **What to bring:**
 - CMU ID
 - Calculator
 - Two pages of notes (double-sided)
- **What not to bring:**
 - Live animals

Administrivia – Course Evals

- Your feedback is strongly needed:
 - <https://cmu.smartevals.com>

Extended Office Hours

- Monday May 4: Andy 12:00–1:00
- Tuesday May 5: Andy 12:00–1:00
- Wednesday May 6: Christos 12:00–1:00
- Thursday May 7: Christos 1:00–3:00
- Friday May 8: Christos 2:00–3:00

Stuff Before Mid-Term

- SQL

Query Optimization & Evaluation

- Operator Algorithms:
 - **Selections:** Access paths
 - **Projections & Group Bys:** Hashing vs. Sorting
 - **Joins:** Nested Loop, Index Nested Loop, Sort-Merge, Grace Hash
- Cost Estimations

Schema Refinement

- Functional Dependencies
 - Armstrong's Axioms
 - Closures
 - Canonical Covers
 - Super Key vs. Candidate Key

Normalization

- Decomposition:
 - Loseless Joins
 - Dependency Preserving
 - Redundancy Avoidance
- Normal Forms
 - 1NF, 3NF, BCNF

Database Design & Tuning

- Index Selection & Clustering
- Denormalization
- Query Tuning / Rewriting

Transactions

- ACID
- Conflict Serializability:
 - How to check?
 - How to ensure?
- View Serializability

Transactions

- Two-Phase Locking
 - Strict vs. Non-Strict
 - Deadlock Detection & Prevention
- Timestamp Ordering
- Multiple Granularity Locking
 - Intention locks
- B+Tree Latch Crabbing
- Isolation Levels / Anomalies

Crash Recovery

- Buffer Pool Policies:
 - STEAL vs. NO-STEAL
 - FORCE vs. NO-FORCE
- Write-Ahead Logging
- Logging Schemes
- ARIES Recovery
 - Phases: Analyze, Redo, Undo

Data Warehouses + Mining

- Data cubes
 - CUBE BY
 - ROLAP vs. MOLAP
- Data Mining
 - Supervised Learning (Decision Trees)
 - Unsupervised Learning (Assoc. Rules)