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Weekly Previews

- Week 01
- Text References
- Prac Work
- Famous DB Nerds #1
- Week 02
- DBMS Architecture
- Famous DB Nerds #2
- Week 03
- How to take this course ...
- Famous DB Nerds #3
- Week 04
- Famous DB Nerds #4
- Week 05
- Famous DB Nerds #5
- Week 07
- Famous DB Nerds #6
- Week 08
- Famous DB Nerds #7
- Week 09
- Famous DB Nerds #8

COMP9315 22T1 ◇ Weekly Previews ◇ [0/28]

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❖ Week 01

Things to Note ...

- Videos + Slides available Sun/Mon each week
- Prac P01 now available ... install PostgreSQL
- Quiz 1 ... out next Monday ... due next Friday
- Assignment 1 released soon ... add a new base type

This Week's Topics ...

- DBMS Revision (Architecture, SQL, RelAlg, Catalogs)
- PostgreSQL introduction and installation
- Storage: devices/files (E16, G11, K9.1, S11)

Next Week's Topics ...

- buffer pool, page internals, tuple representation

COMP9315 22T1 ◇ Weekly Previews ◇ [1/28]

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❖ Text References

References to material in texts use format:

- Book Chapter . Section .... (e.g. E2.1.1)

Books are denoted by:

- G = Garcia-Molina/Ullman/Widom
- S = Silberschatz/Korth/Sudarshan
- E = Elmasri/Navathe
- K = Kifer/Bernstein/Lewis

COMP9315 22T1 ◇ Weekly Previews ◇ [2/28]
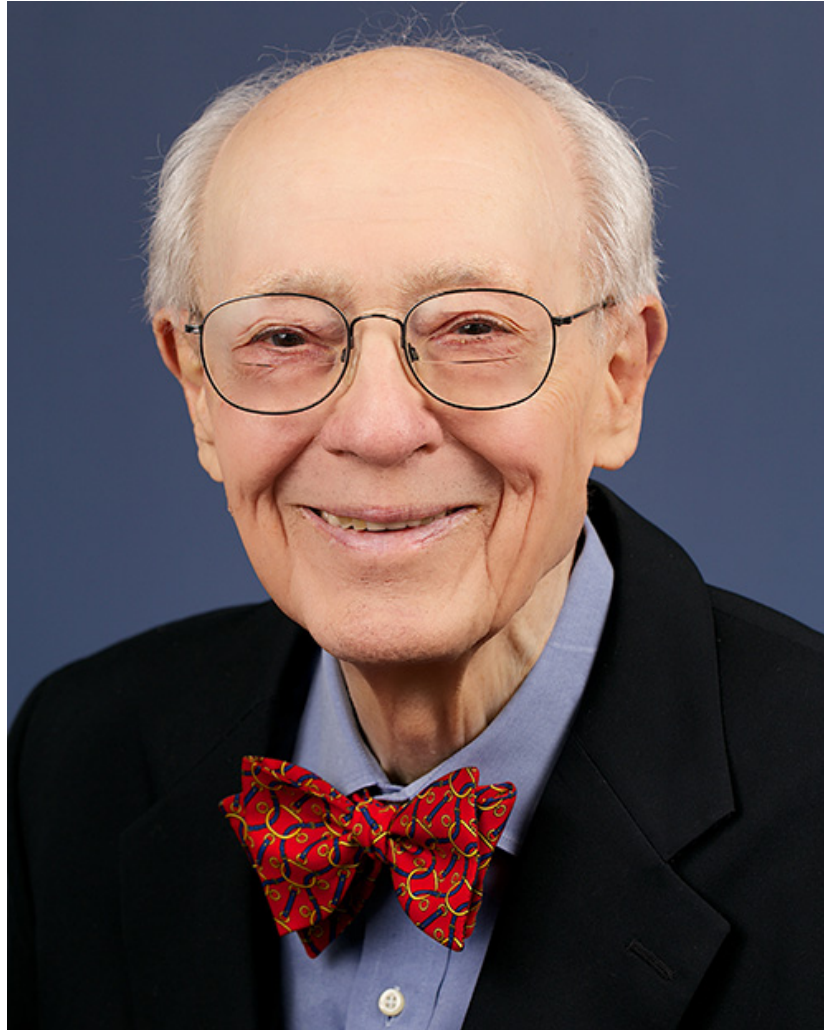
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❖ Prac Work

Some hints/tips:

- Read instructions ... read log/error messages ... debug

- Give complete context when asking for help (OS, settings, etc)

- Do all PostgreSQL work on vxdb   (or on your laptop)

  - `ssh -Y zID@nw-syd-vxdb.cse.unsw.edu.au`

  - binaries compiled on vxdb only run on vxdb

  - other incompatible versions of PostgreSQL exist
    try `which psql` ... if not the version under
    `/localstorage/zID` ...

- Stop the server after playing with it

COMP9315 22T1 ◇ Weekly Previews ◇ [3/28]

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❖ Famous DB Nerds #1

The first in a series on famous database people ...

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❖ Famous DB Nerds #1 (cont)

Charles
Bachman

- First to develop notion of "database"
- Turing Award 1973, for this achievement
- 1950 Michigan State College, Mech Eng
- 1950-1960 Dow Chemical, process control
- 1957 ... first business EDP department
- **1964** ... MIACS (manufacturing control system)
  - ○ Integrated Data Store (IDS)
  - ○ Store, Retrieve, Modify, Delete
  - ○ Transaction-oriented processing
  - ○ Bachman diagrams (pre-cursor to ER)
  - ○ Locking, deadlock-detection/recovery
- 1971-1980 Honeywell, IDS development
- 1980-1996 Bachman Info Sys, CASE tools

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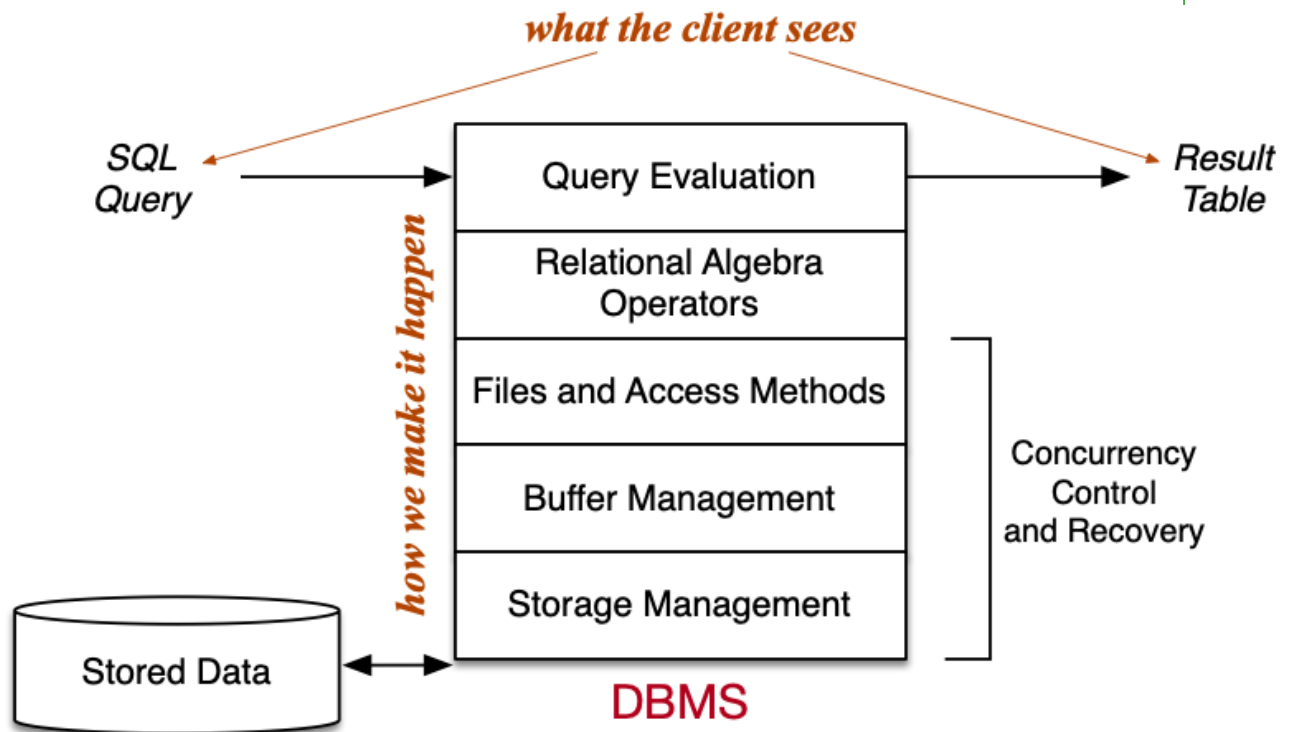
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❖ Week 02

Things to Note ...

- Quiz 1 ... out Monday 9am ... due Friday 23:59
  (may need to look at PostgreSQL documentation to answer some questions)

- Assignment 1 ... out week 2 ... due week 5

This Week's Topics ...

- Storage: disks and files (E16.2, G15.7, K9.1, S11.5)
- Storage: buffer pool/cache (E16.3, G15.7, K9.1, S11.5)
- Storage: page internals (E?, G8.3, S11.8)
- Storage: representing tuples (E16.4, G12, S11.7)

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❖ DBMS Architecture

what the client sees

SQL Query → Query Evaluation → Result Table

how we make it happen

| Query Evaluation |
| Relational Algebra Operators |
| Files and Access Methods |
| Buffer Management |
| Storage Management |

Concurrency Control and Recovery

Stored Data ↔

DBMS

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❖ Famous DB Nerds #2

The next in a series on famous database people ...

COMP9315 22T1 ◇ Weekly Previews ◇ [8/28]

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❖ Famous DB Nerds #2 (cont)

Michael Stonebraker

- Professor, UC Berkeley (1971-2000)
- ACM Turing Award 2014
- IEEE John von Neumann Medal 2005
- Developed/commercialised several DBMSs:
  - Ingres: very early relational DBMS
  - Distributed Ingres: very early dDBMS
  - Postgres: object-relational DBMS (Illustra)
  - XPRS: Parallel Postgres
  - Mariposa: federated data system (Cohera)
  - Aurora: stream processing (StreamBase)
  - C-store: column-oriented DBMS (Vertica)
  - Morpheus: data integration system (Goby)
  - H-store: distributed XP system (VoltDB)
  - SciDB: DBMS for scientific apps (Paradigm4)
- Currently Adjunct Professor at MIT

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❖ Week 03

Things to Note ...

- Assignment 1 due before 9pm Friday 18 March
- Quiz 2 coming next week ... under Activities (or in right sidebar)

This Week ...

- Storage: representing tuples (E?, G12, R9.6-7, S11.7)
- Relational Algebra Operations (E5.7-9, G15, R13,14.3, S13.4,6)
- RelOps: Scan, Sort (E18.2, G15.1-2, R13, S13.4, K10.2)

Coming Up ...

- Relops: Projection, 1d Selection, Hashing, Indexing, Nd Selection

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❖ How to take this course ...

Under Videos and Slides each week

- Week X Preview ... this, available Sunday
- Content videos ... a collection of short videos
- Online sessions ... appear as sessions happen

Look at the content videos, ask questions.

Look at the Theory Exercises for questions on each topic.

Online sessions will (try to) do one exercise for each topic.

COMP9315 22T1 ◇ Weekly Previews ◇ [11/28]

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❖ Famous DB Nerds #3

The next in a series on famous database people ...

Don Chamberlin   Jim Mehl   Ray Lorie

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❖ Famous DB Nerds #3 (cont)

- IBM San Jose Research Centre
- Members of System R Team
  - System R (1975) first prototype RDBMS
  - Pioneered architecture of modern RDBMSs
- Chamberlin: Design of SQL (SEQUEL)
- Lorie: Buffer manager, optimizer, SQL
- Mehl: First SQL parser
- to see a modern SQL parser:
  - postgresql-14.1/src/backend/parser

COMP9315 22T1 ◇ Weekly Previews ◇ [13/28]

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❖ Week 04

Things to Note ...

- Assignment 1 due before 9pm Friday 18 March
- Quiz 2 due before Friday 12 March, 9pm
- Quizzes are *fortnightly* (weeks 2,4,6,8,10)
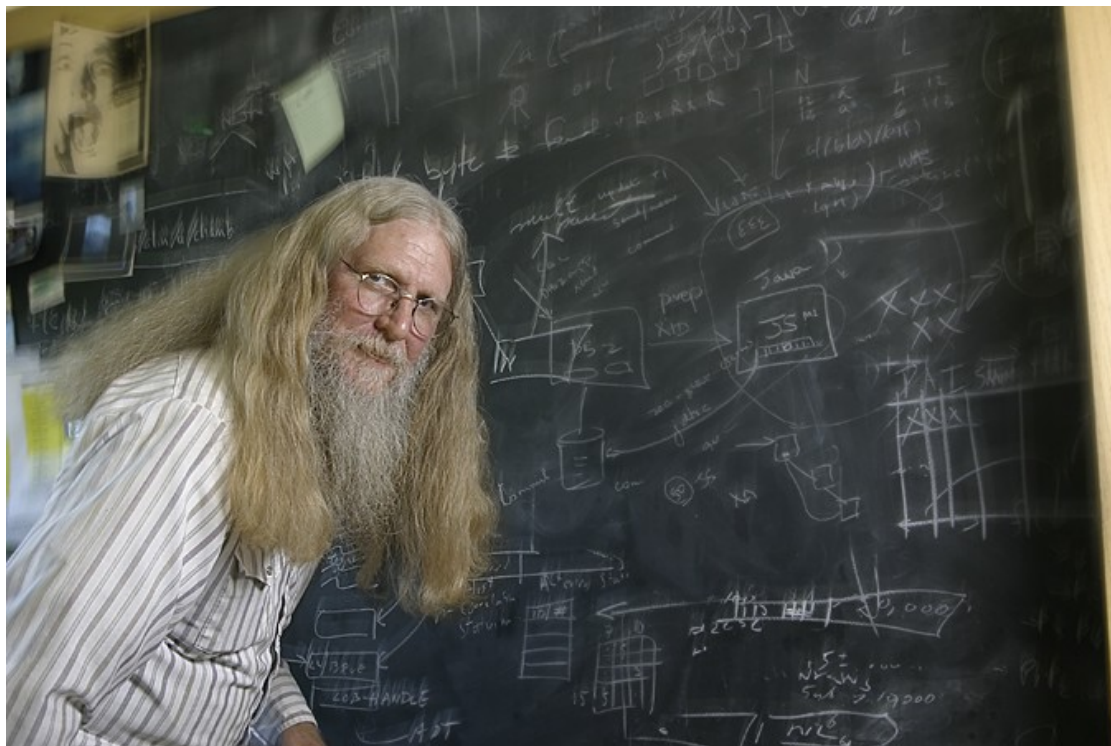
This Week ...

- Projection (E18.2, G15.2, R14.3, S13.6, K10.3)
- Selection (heaps, sorted files) (E16.6,7, G14, S12.1, K9.2,3)
- 1d Selection (hashing) (E16.8,17, G14, S12, K9.4-6)

Coming Up ...

- 1d Selection (indexing), Nd Selection

COMP9315 22T1 ◇ Weekly Previews ◇ [14/28]

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❖ Famous DB Nerds #4

The next in a series on famous database people ...

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❖ Famous DB Nerds #4 (cont)

Bruce Lindsay

- PhD UC Berkeley 1976
- Part of System R Team at IBM
  - buffer pool manager, ...
- Since System R:
  - distributed databases (R*)
  - transactions/concurrency control
  - query optimisation
  - composite objects in RDBMS
  - database replication
- IBM Research Fellow (Almaden Lab)
- Chief Data Scientist, Paradata

COMP9315 22T1 ◇ Weekly Previews ◇ [16/28]

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❖ Week 05

Things to Note ...

- Assignment 1 due before 9pm THIS Friday (18 March)
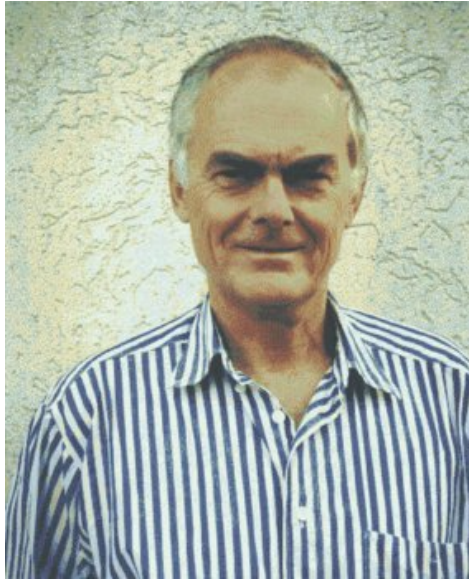- **NO** quiz this week ... work on assignment

This Week ...

- 1d Selection (indexes, B-trees) (E16.8,17, G14, S12, K9.4-6)
- Nd Selection: indexes, hashing (E18.2, G14.4-6, S12.5, K10.4)

Coming Up ...

- Implementing Join (EN15.3, GUW15, RG14.4, SKS13.5)
- Query execution and optimisation (EN18, GUW16, RG12, KSS13)

COMP9315 22T1 ◇ Weekly Previews ◇ [17/28]

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❖ Famous DB Nerds #5

The next in a series on famous database people ...

COMP9315 22T1 ◇ Weekly Previews ◇ [18/28]

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❖ Famous DB Nerds #5 (cont)

Rudolf Bayer

Ed McCreight

- Together, they invented the B-tree (1972)
- **Bayer**
  - Extensive database research career
    - access methods (B-tree, UB-tree, ...)
    - deductive and XML databases
    - query processing in digital libraries
  - Now, Emeritus Prof, Technical U Berlin
- **McCreight**
  - Unis: Washington, Stanford, TUM, ETH
  - Worked for Boeing, Xerox PARC, Adobe
  - Now, retired to Switzerland

COMP9315 22T1 ◇ Weekly Previews ◇ [19/28]

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❖ Week 07

Things to Note ...

- Assignment 2 out now ... due 9pm Friday 15 April
- Quiz 3 out Monday ... due 9pm Friday 1st April
- Quiz 4 ... during Week 08

This Week ...

- Signature-based Indexing (E17.4, GUW14.4-6, SKS12.5, K?)
- Implementing Join (EN15.3, GUW15, SKS13.5, K10.5)

Coming Up ...

- Query execution and optimisation (EN18, GUW16, SKS13, K11)

COMP9315 22T1 ◇ Weekly Previews ◇ [20/28]

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❖ Famous DB Nerds #6

Next in a series on famous DB nerds

COMP9315 22T1 ◇ Weekly Previews ◇ [21/28]

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❖ Famous DB Nerds #6 (cont)

Paul Larson

Witold Litwin

- Together, invented linear hashing
- Litwin: University Paris 9 Dauphine
  - ○ Awarded ACM Fellowship 2001
  - ○ Query processing, distributed databases
  - ○ Recently: secure data in cloud databases
- Larson: U Waterloo, Microsoft Research
  - ○ Awarded ACM Fellowship 2004
  - ○ Query processing/optimization
  - ○ Recently: SQL server, main-memory databases

COMP9315 22T1 ◇ Weekly Previews ◇ [22/28]

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❖ Week 08

Things to Note ...

- Assignment 1 ... marks out soon (can Collect already)
- Assignment 2 ... due end Week 9 (9pm Friday 15 April)
- Quiz #4 ... due this Friday 9pm

In This Lecture ...

- Query execution and optimisation (EN18, GUW16, RG12, KSS13)

Coming Up ...

- Transactions, concurrency, recovery

COMP9315 22T1 ◇ Weekly Previews ◇ [23/28]

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❖ Famous DB Nerds #7

The next in a series on famous database people ...

COMP9315 22T1 ◇ Weekly Previews ◇ [24/28]

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❖ Famous DB Nerds #7 (cont)

Masaru
Kitsuregawa

- BE(ElecEng) University of Tokyo (1978)

- PhD(CompSci) University of Tokyo (1983)

- Academic at University of Tokyo (1983..)

- Developed GRACE database machine
  - parallel relation algebra machine
  - including grace hash join algorithm

- 2009 SIGMOD Innovations Award

- Director General, NII (National Institute of Informatics)

COMP9315 22T1 ◇ Weekly Previews ◇ [25/28]

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❖ Week 09

Things to Note ...

- Assignment 2 ... due 9pm Fri 15 April (THIS Friday)
- Quiz 5 ... next week ... due 9pm Fri 22 April
- Simple testing script now available (`tests.sh`)

Topics for this week ...

- Transaction Processing (EN17, GUW8.6, RG16, KSS15)
- Implementing Isolation (EN18, GUW18,19, RG17, KSS16)
- Implementing Atomicity/Durability (EN19, GUW17, RG18, KSS17)

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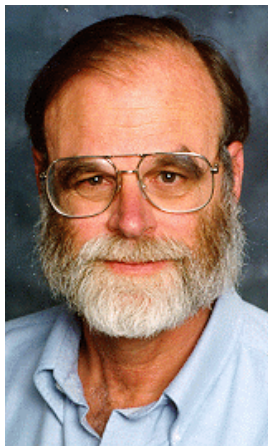# ❖ Famous DB Nerds #8

The next in a series on famous database people ...

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❖ Famous DB Nerds #8 (cont)

Jim Gray

- Pioneered transaction processing
- 1969 PhD from UC Berkeley
- 1970-1995 IBM, Tandem, DEC
- 1999 Turing Award   (for tp research)
- 1995-2007 Microsoft Research Lab (oh well)
- Other work: scientific databases, sensor networks
- Present whereabouts unknown ...
  - disappeared at sea, 27 Jan 2007

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