



MONASH University

Information Technology

FIT2094 Databases

Week 1 - Introduction

Lindsay Smith

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algorithm distributed systems **database**
systems **computation** knowledge ma
design e-business **model** data mining **int**
distributed systems **database** software
computation knowledge management **an**



MONASH
University

Faculty of Information Technology

Industry Based Learning Program

Information Session

Information on eligibility and how to apply for the IBL program

WHEN ? *Tuesday 8 August*

Attend one of two sessions: 11am – Midday or 2pm-3pm

WHERE ? *Lecture Theatre M3
37 Rainforest Walk*

RSVP ? *You do not need to RSVP ...*

But please come on time as there is limited seating (~120)

Your Teaching Team

Lecturers



Lindsay Smith (wks 1 – 6)



Aamir Cheema (wks 7 – 12)

Tutors



Vidya Saikrishna (Head Tutor)



Ahmad Choudhry



Tennyson Yuan



Tom Wei

Overview

- Teaching Method
- A summary of topics to be studied in FIT2094

Teaching Method

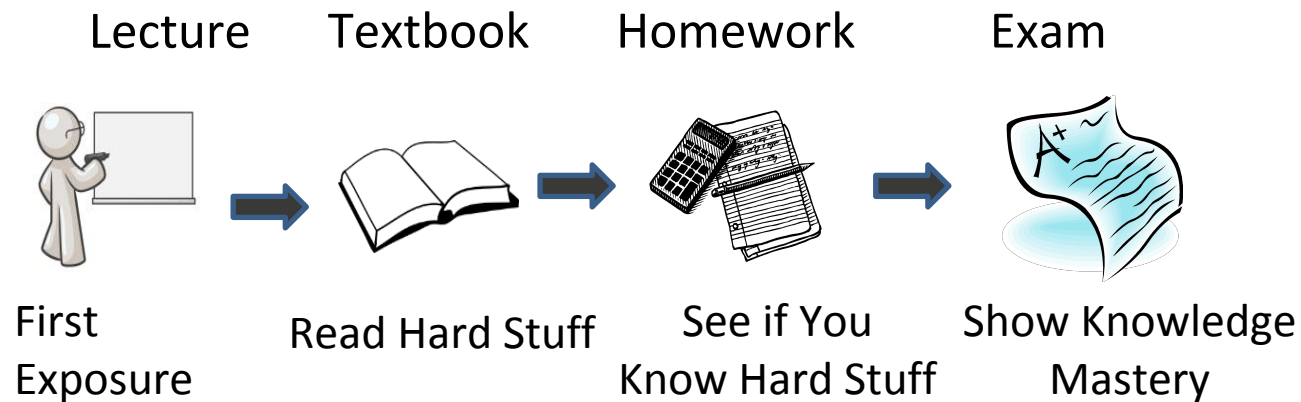
- Your peers help you to understand the concepts through discussion.
- Lecture includes a series of discussions on concepts.
- The lecturer guides the discussion.

Peer Instruction

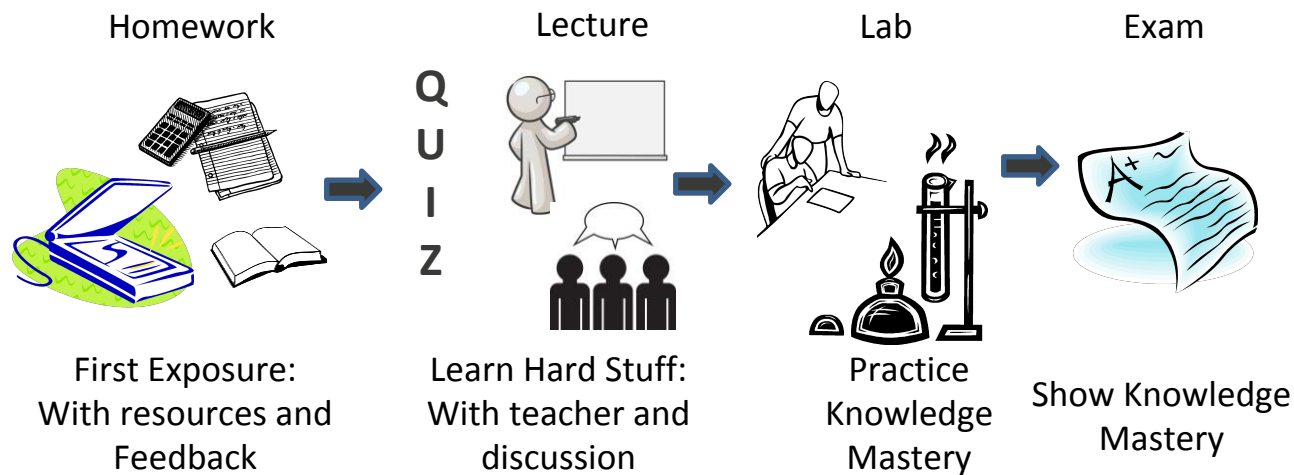


Prof Eric Mazur, Harvard University

Traditional Teaching Method



Peer Instruction – Full Picture



Discussion Questions – Scenario

- Lecturer shows a question.
- Student answers using the response system. (no discussion – individual vote).
- *If uncertainty*
 - Group discussion (2-3 students) – need to get a consensus.
 - Student answers using the response system (group vote – everyone in the group still needs to vote).
 - Class wide discussion.

Why The Scenario?

- Pose carefully designed question
 - Solo vote: Think for yourself and select answer
 - Checks your understanding and create an opinion to base your discussion during the group discussion, if needed.
 - *If needed*
 - Discuss: Analyze problem in teams of 2-3
 - Practice analyzing, talking about challenging concepts
 - Reach consensus
 - Group vote: Everyone in group votes
 - You must all vote the same
 - Convince your group or get convinced by your group.
 - Class wide discussion.



Let's Practice

Using MARS

1. Visit <http://mars.mu> on your internet enabled device
2. Log in using your Authcate details (not required if you're already logged in to Monash)
3. Touch the + symbol
4. Enter the code for your unit: **F5CQAT**
5. Answer questions when they pop up.

Multiple choice questions

Q1: $1 + 1 = ?$

Hint: There are 10 types of people in this world. Those who understand binary and those who don't.

- a. 2
- b. 10
- c. 11
- d. Not sure

Text-based poll

Q2: Write the name of your favourite fruit.

Q3. What database management systems are you familiar with?

- a. Oracle
- b. MySQL
- c. MS Access
- d. SQL Server
- e. others
- f. I am not familiar with any database management systems.

Is it bad to get it WRONG?

NO

It is better to be WRONG and understand why you are WRONG, rather than, getting the RIGHT answer but NOT knowing WHY it is the RIGHT answer!

Why Peer Instruction?



- Learn/practice hard concepts in class
- Build and test one's understanding in a supportive environment.
- Develop critical thinking, communication and reflection skills.
- Engage students to take ownership of their learning.

Things are different...

- Pre-lecture activities are crucial.
 - Your lecture experience will depend on your preparation.
- Attending lectures is very important
- My lecture slides are NOT your notes!
 - Create your own notes during pre-lecture reading.
 - Annotate difficult concepts, revisit the annotation after lecture/tutorials.
 - It is better not to take notes during lecture. You should be prepared before the lecture, then **think, discuss and ask questions** during lectures.

Study Program

Week	Activities	Assessment	
0		No formal assessment or activities are undertaken in week 0	
1	PART I: The Relational Model Introduction to Database		
2	Relational Model	Pre-lecture Quiz Questions due weekly prior to the lecture (Weeks 2 to 11)	5%
3	PART II: Database Design Conceptual model - E/R Diagram		
4	Logical model - E/R Transformation		
5	Normalisation		
6	Database Design Language (DDL)		
7	PART III: The SQL Database Language SQL I	Assignment 1 due	20%
8	Data Manipulation Language (DML)		
9	SQL II		
10	SQL III	Assignment 2 due	10%
11	PART IV: Web Database Implementation Database Connectivity and Web Technologies - Querying data		
12	Web Technologies - Manipulating data	SQL Test	15%



FIT2094 2017 S2

FIT Database Teaching Team

SYLLABUS



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Interactive (2.6 MB)



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Printable (2.9 MB)

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FIT2094 2017 S2

FIT Database Teaching Team
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CONTENTS

1 Introduction to SQL Developer

- 1.1 Connecting to Oracle database using SQL Developer
- 1.2 Using SQL Developer GUI to manage data
- 1.3 Data Anomalies

2 The Relational Data Model FIT2094

3 Conceptual Modelling

- 3.1 Building Conceptual Models
- 3.2 Using Tools to draw ERD

4 Logical Modelling

- 4.1 Logical Modelling – Task B – Rental Model

5 Normalisation



Overview

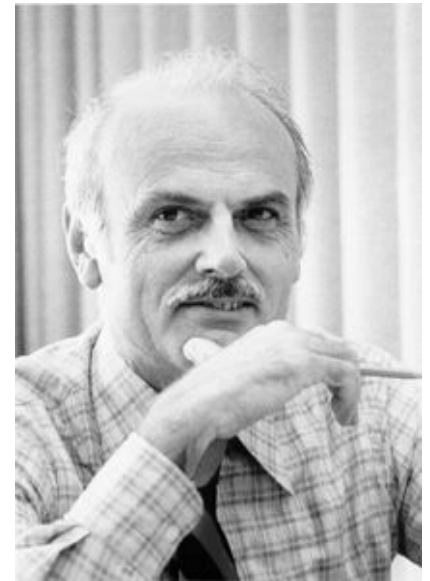
- An overview of relational database management systems (RDBMS)

Let's travel back to 1960s

- Relational databases do not exist yet
- Let's create a database to record the information on Monash students
 - What kind of approaches do we have?
 - What kinds of problems are involved?

1970: Relational model

- An IBM scientist
 - Proposed and developed the relational model
 - Also proposed normalisation forms
 - Resistance from IBM to implement his model
 - Turing award (1981)
-
- Relational model in week 2
 - Normalisation in week 5
 - E. F. Codd, “A Relational Model of Data for Large Shared Data Banks”, *Comm. Of ACM*, 1970



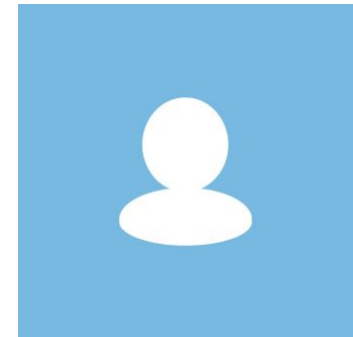
E.F Codd (1923-2003)

1974: SQL

- Developed at IBM
 - Initially called SEQUEL (**S**tructured **E**nglish **Q**Uery **L**anguage)
 - Doesn't strictly follow Codd's theory
 - Oracle: the first commercially available implementation of SQL in 1979
-
- SQL in weeks 7, 8, 9 & 10
 - D Chamberlin, R Boyce, "SEQUEL: A structured English query language", *ACM SIGFIDET*, 1974



Donald Chamberlin (1944-)



Raymond Boyce
(unknown - 1974)

1976: Conceptual model

- Proposed Entity-Relationship Model (ER diagram)
- A systematic process to design a relational database
- Database design process in week 3 & 4
- Peter Chen, “The entity-relationship model—toward a unified view of data”, *ACM TODS*, 1976



Peter Chen (1947 -)

1979: Oracle

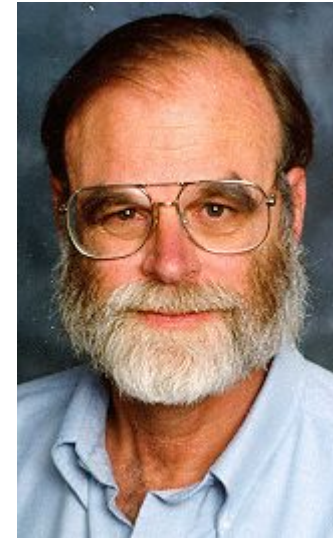
- Inspired by Codd's ideas
- First commercial release in 1979
- Most popular RDBMS
- Introduced PL/SQL in 1988
(Procedural Language/SQL)
- Oracle SQL in week 7, 8, 9 & 10



Larry Ellison (1944 -)

1981: Transactions management

- Introduced transaction management
- Turing award (1998)
- Presumed lost at sea in 2007
- Transaction management in week 8
- Jim Gray, “The Transaction Concept: Virtues and Limitations”, *VLDB*, 1981

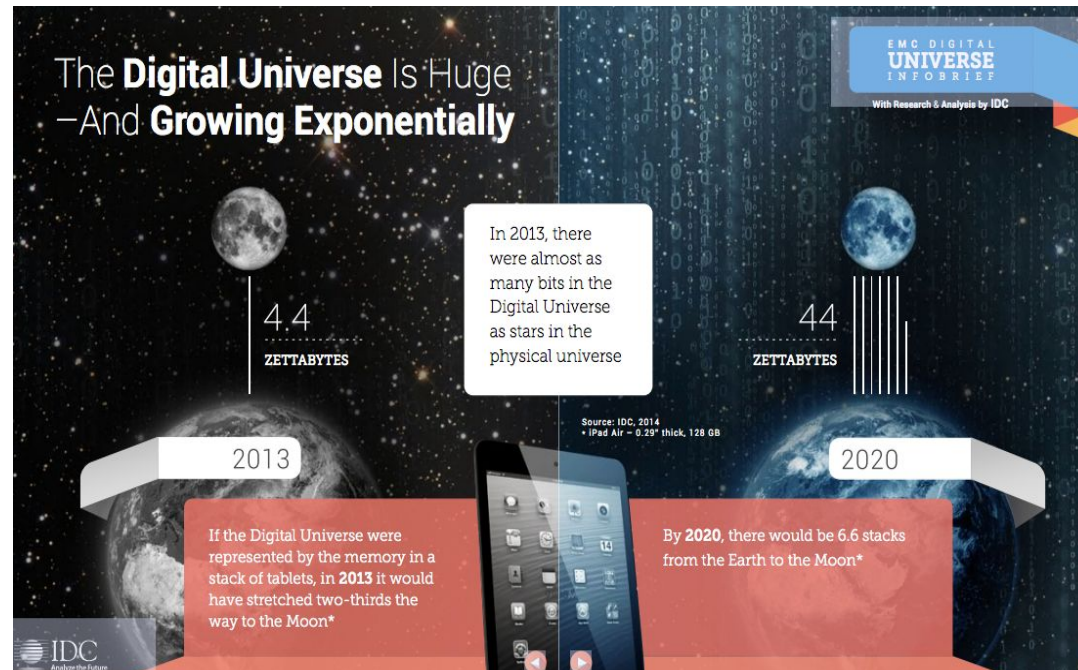


Jim Gray (1944 -)

Data management Today

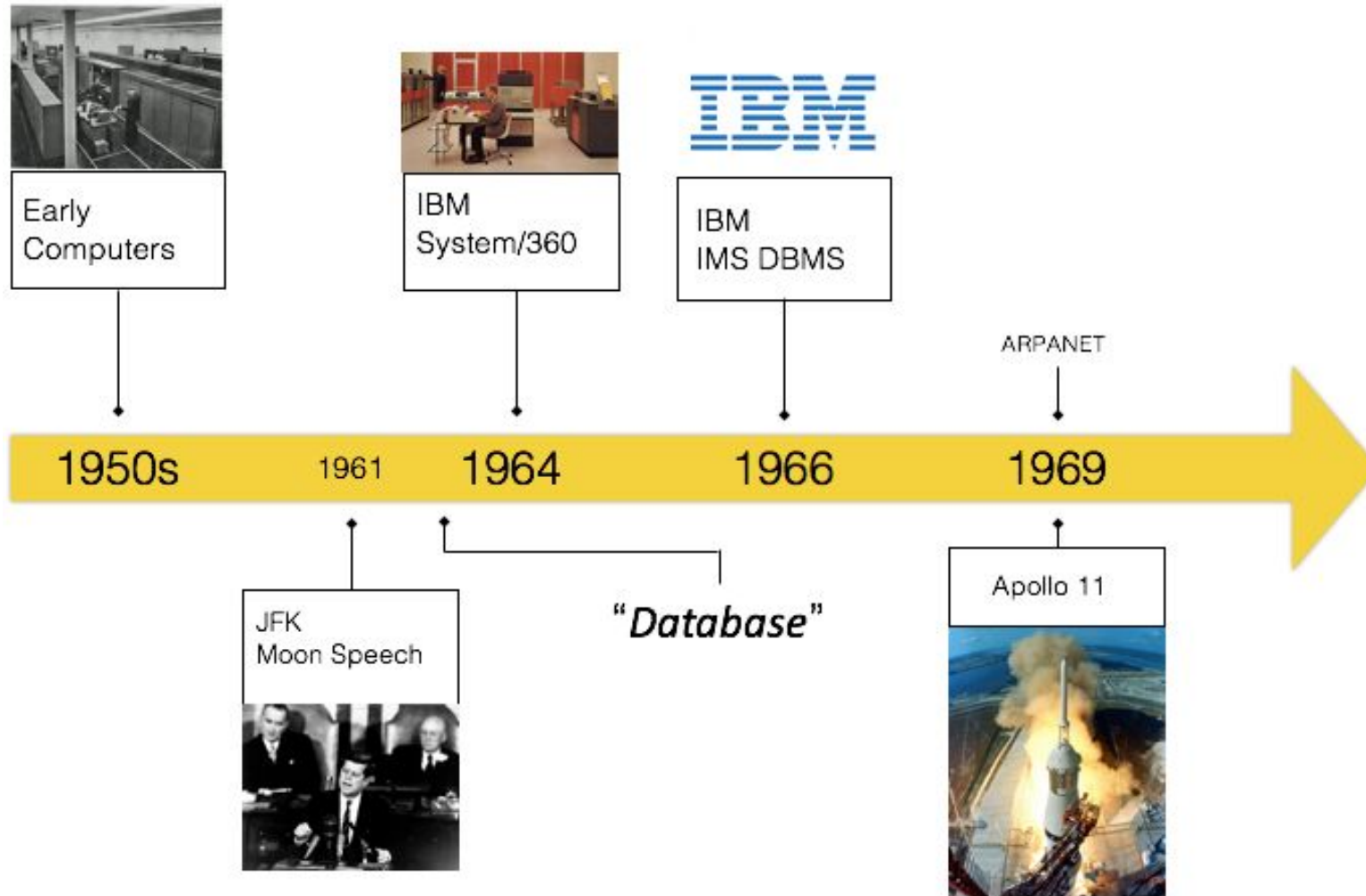
- Relational databases are still very popular. But ...
 - Social Networks (Facebook, Twitter, Foursquare etc.)
 - Multimedia data (YouTube, Pinterest, Facebook etc.)
 - Data streams (Twitter, computer networks)
 - Spatial data (Road networks, Google Earth, Space etc.)
 - Textual data
 - Web data
 - Big Data
 - ...

<https://goo.gl/zMxG3b>



<http://db-engines.com/en/ranking>

In Perspective ...





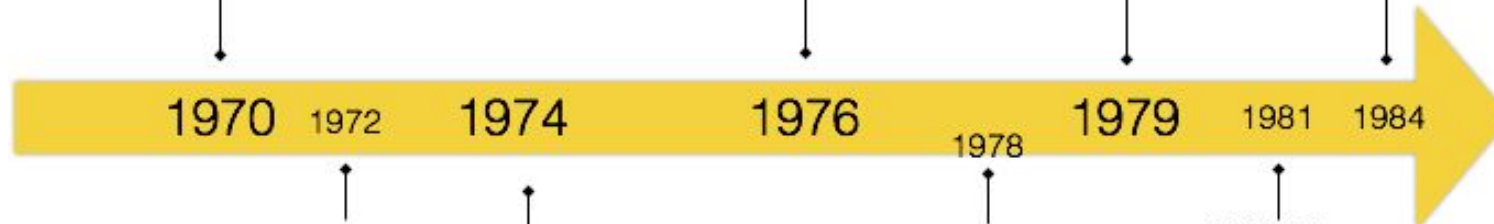
Relational
Data Model



Entity
Relationship
Data Model



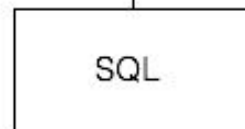
Apple
Macintosh

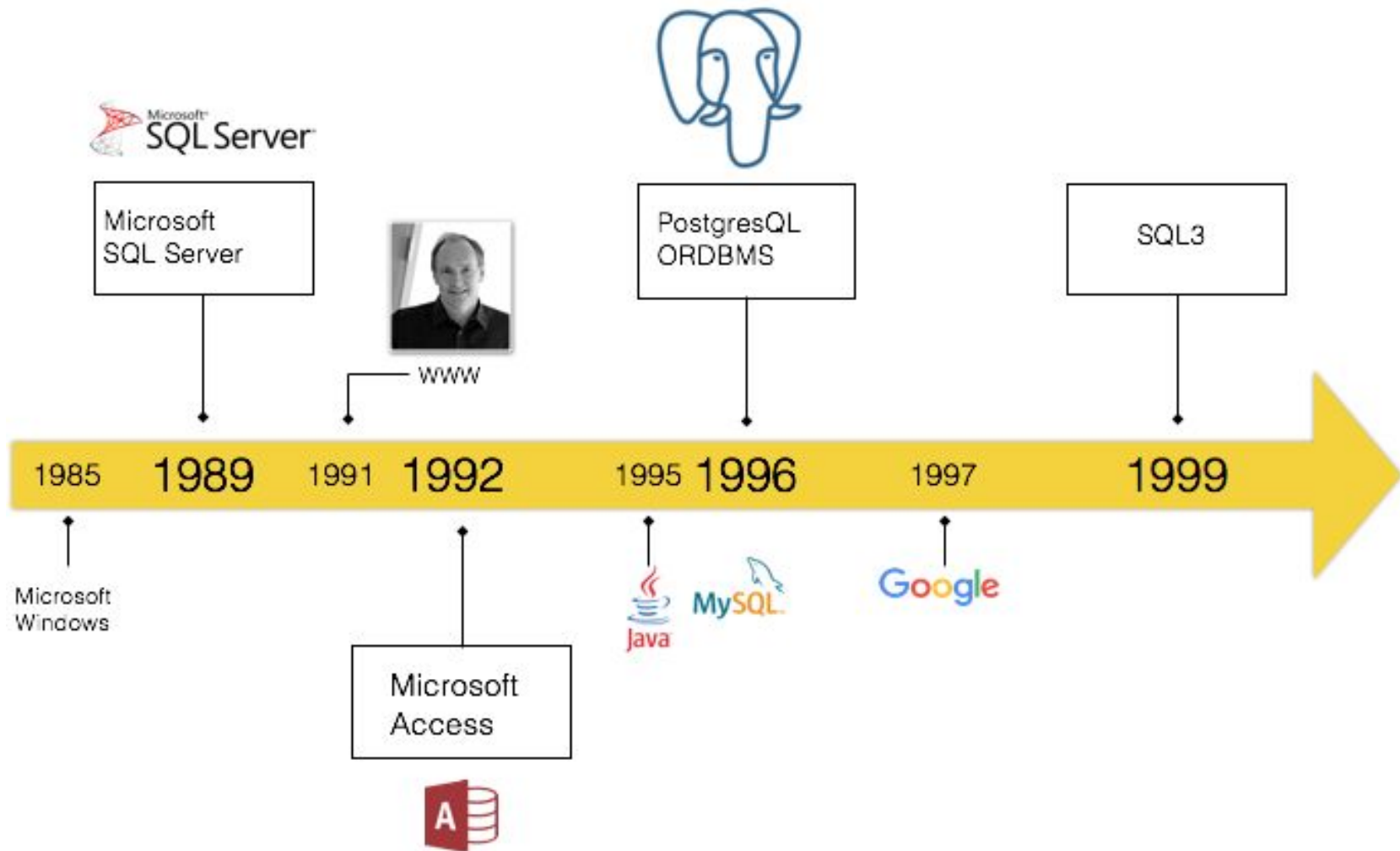


Unix/C

IPv4

IBM PC





Hadoop/GFS
MapReduce

2003

2004



2006



Rise of
NoSQL

2009













IBM
IMS DBMS
V14

2015

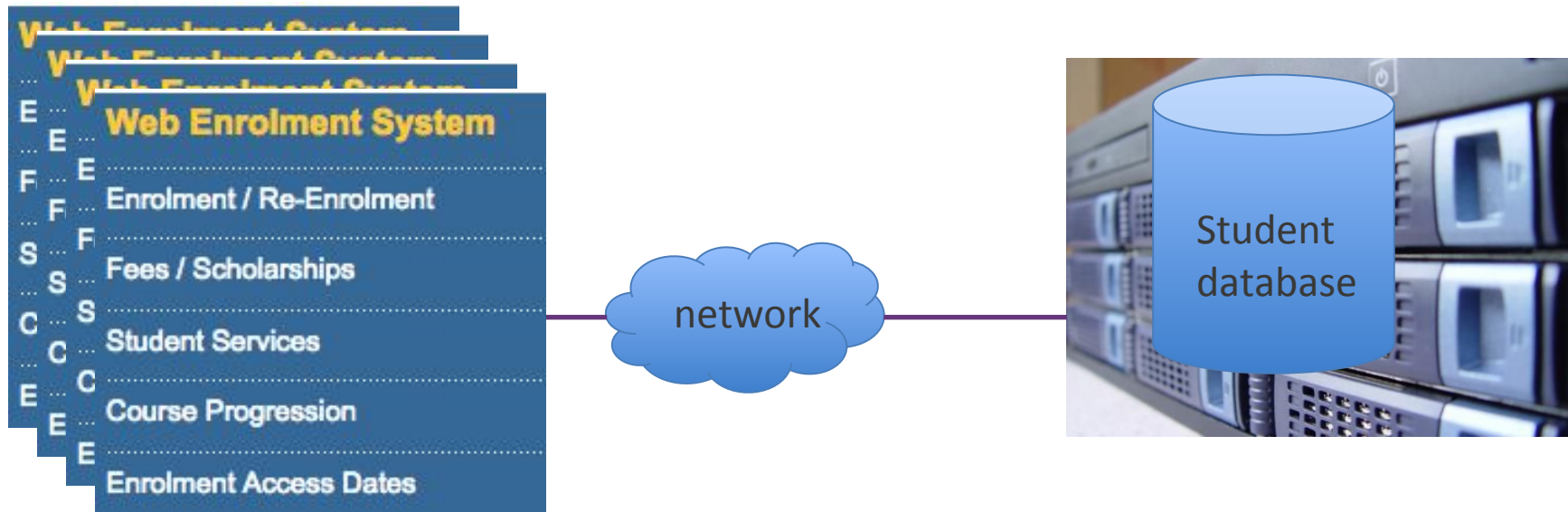


2016

Zettabyte
Era

Rank	DBMS	Type	Introduced
1	 ORACLE®	commercial Relational	1979
2	 MySQL	open-source Relational	1995
3	 Microsoft® SQL Server™	commercial Relational	1989
4	 PostgreSQL	open-source Relational	1996
5	 mongoDB	open-source NoSQL	2009
6	 IBM DB2	commercial Relational	1983
7	 CASSANDRA	open-source NoSQL	2008
8	 MS Access	commercial Relational	1992
9	 SQLite	open-source Relational	2000
10	 redis	open-source NoSQL	2009

Relational database systems in action: End-users' view

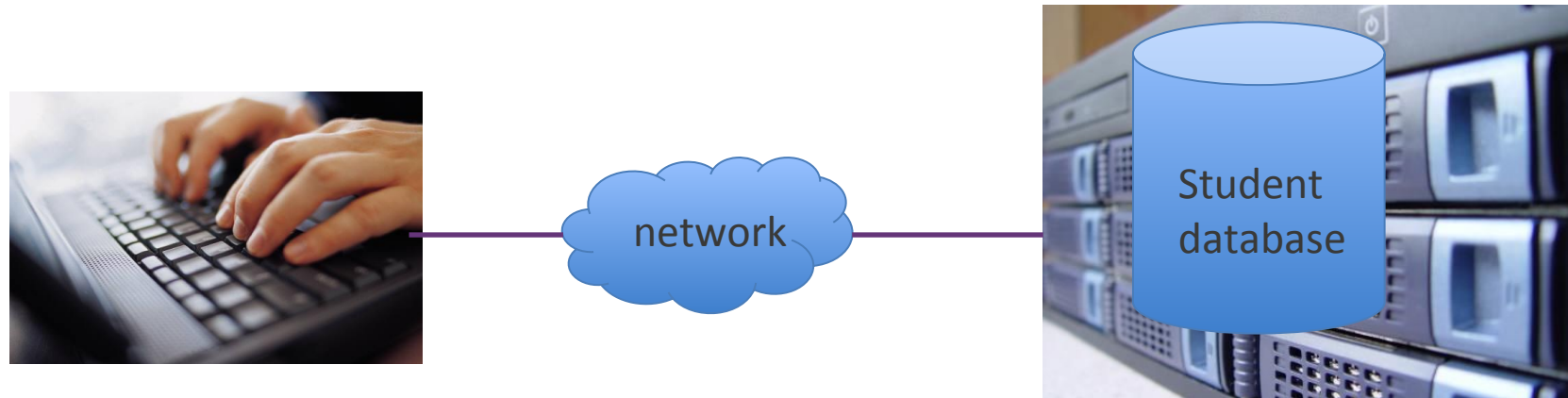


Front end application
(client)

Student Database is
implemented in an
Oracle DBMS
(server)

Database Systems in Action

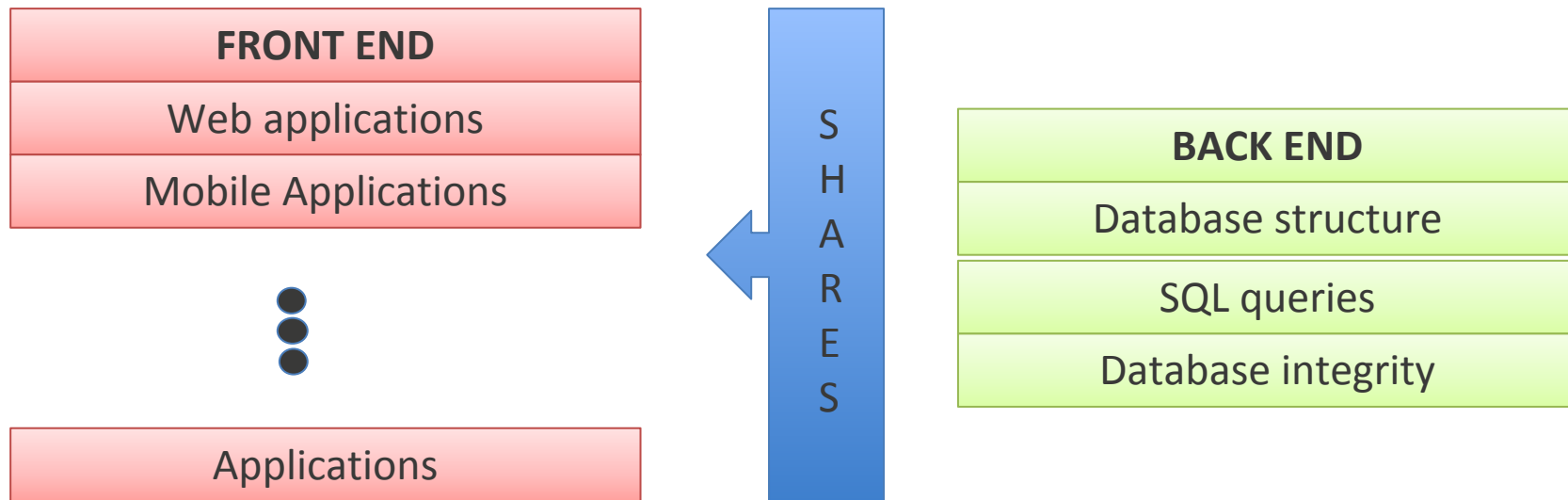
Developers' View



Development environment
(client, eg SQL Developer,
Integrated Development
Environment for web scripting)

Student Database
(server)

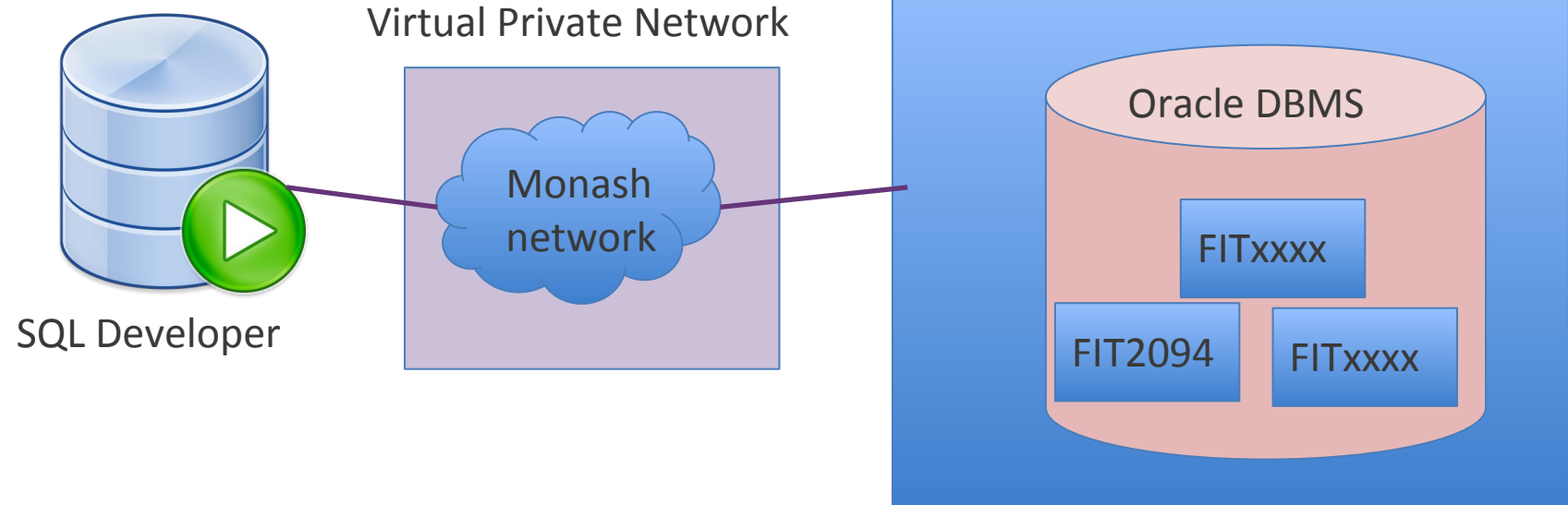
Developing Application with Database




In this unit, we will concentrate on building the back end.
Database designer.

Database Systems in FIT2094

fit2094.corp-prd.aws.monash.edu



A full-body photograph of a smiling, bald man with a grey beard. He is wearing a dark blue suit jacket, a light yellow shirt, and a colorful striped tie. He is holding a large, dark grey rectangular sign in front of his chest with both hands. The sign has the text 'Tutorials start from today' written on it in a bright yellow, sans-serif font. The background is plain white. At the top of the slide, there is a solid purple horizontal bar with a small downward-pointing triangle on its left side.

Tutorials start
from today