MONASH University

MONASH
INFORMATION
TECHNOLOGY

Week 1 - Introduction

FIT3171 Databases
Semester 1 2022

Malaysia Campus

Unit Overview

- Unit purpose/background
  - An introduction to databases, mostly RELATIONAL databases (RDBMS)
  - NO expected background in databases
- Student time commitment
  - Monash University 6 credit point unit = 12 hours of work per week
  - Schedule
    - 2 hrs Forum session
    - 2 hrs Tutorial session
    - 8 hrs of your own assigned time (pre Forum activities, completing Tutorial session activities, assignments etc)

Your FIT3171 S1 2022 Unit Management

Chief Examiner: Dwi Rahayu (Australia)

Lecturer: Golnoush Abaei

Head Tutor: Nursyarizan Mohd Akbar

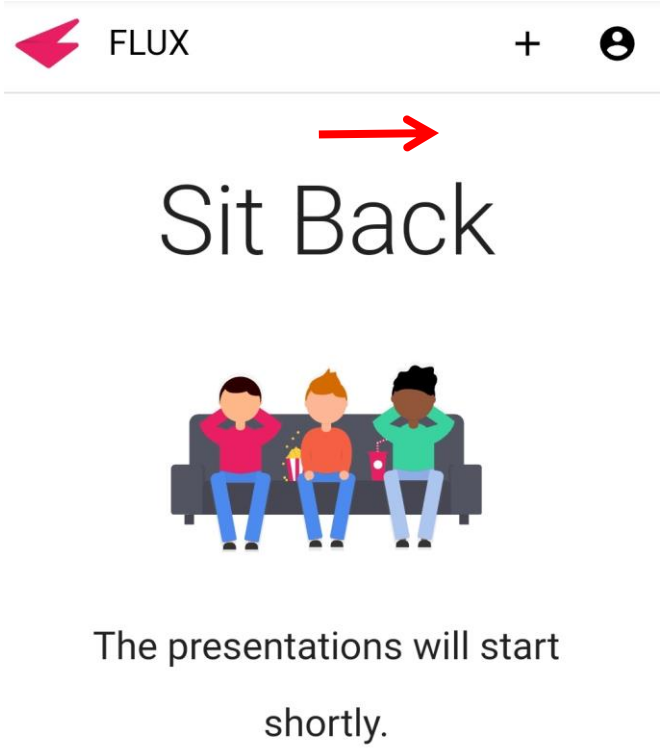
Tutor: Ashvini Devi Krishnan

Flux.qa: for lecture participation

- Participation is voluntary, and is not assessed – but good for your education!
- Use your smartphone, iPad or computer etc. Search online for https://flux.qa
- Login via your Monash account
- Join an audience: use the + button
- Type 6 digit code. QBGYRS
- Answer questions when they pop up
- Change your response while polling open.

Flux.qa: for lecture participation

flux.qa/QBGYRS



Question. Have you watched pre-recorded videos?

A. Yes
B. No

Question. 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

Question. Write the name of your favourite influential person in information technology.

Question. Which programming unit did you study before taking this unit?

Question. What is the email address to use for admin enquiries for this unit?

A. dwi.rahayu@monash.edu
B. minh.le@monash.edu
C. golnoush.abaei@monash.edu
D. fit2094-fit3171.allcampuses-x@monash.edu
E. My tutor's email address from Moodle

Email Contact

- Email Contact
  - During the semester **your first contact *must be your tutor*** unless the matter is a unit administration matter
    - tutors will be assigned during the first few weeks after Allocate settles. Your tutor will supply you with their email address, it is also available from Moodle "Teaching Team and Unit Resources" page
  - Admin matters (absences, class issue, etc) email the FIT3171 role account: **golnoush.abaei@monash.edu**
  - **Note** the FIT3171 Email requirements:
    "When you contact staff via email, please ensure you clearly include your full name, unit code, and tutorial number as part of every email you send. This will ensure we can respond as quickly and accurately as possible."
    - You must email from your Monash University email account
    - *email which does not comply will **not be responded to***

Study Program

Focus	Week	Study Area	Assessment Due
	0	Recommended background videos to watch	
	1	Introduction to Database	
DB Design	2	Database Design I: Conceptual Modelling	
	3	Relational Model	
	4	Normalisation	
	5	Database Design II: Logical level modelling	Ass1A Thur 1:30 PM
SQL	6	Creating and Populating the Database	
	7	SQL Part I - SQL Basic	
	8	Update, Delete and Transaction Management	Ass1B Thur 2:30 PM
	9	SQL Part II - SQL Intermediate and SQL Advanced	
	10	PL/SQL: Procedures and Triggers	
	11	Non Relational Databases - Big Data and NoSQL	
	12	Business Intelligence, Data Warehousing and Future Directions	Ass 2 Thur 2:30 PM

Malaysia Time

10%

25%

25%

In Semester
Total 60 marks
60% of grade

Exam Wk 14+
40% of grade

Monash University Grading Scheme

Overall student average result

High Distinction (HD) 80-100	Distinction (D) 70-79	Credit (C) 60-69	Pass (P) 50-59	Fail (N) 0-49
Demonstration of extended knowledge, skills and attributes at an exceptional level*, showing fluency, originality and integration of concepts.	Demonstration of extended knowledge, skills and attributes at a superior level*, showing fluency and emerging originality and integration of concepts.	Demonstration of fundamental knowledge, skills and attributes at a proficient level*, showing fluency in concepts.	Demonstration of fundamental knowledge, skills and attributes at a satisfactory level*.	Lack of satisfactory demonstration of fundamental knowledge, skills and expected attributes*.

Hurdle requirement: Students must achieve a minimum of:

45% in semester, 45% examination and 50% overall to PASS the unit

If your overall grade is a PASS but you fail a hurdle your result will be 45% NH

Further explanation see here: https://www.monash.edu/students/admin/exams/results/results-legend

Question. The following table shows some possible student results for this unit. Working in your group calculate the student's final grade in each scenario:

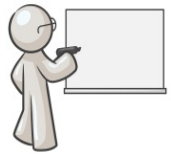
In Semester Mark Out of 60	Exam Mark Percentage	Overall Mark	Final Mark Percentage	Final Letter Grade
45	62			
25	62			
20	35			
34	45			
50	82			
50	40			
30	46			

Grade explanation here: https://www.monash.edu/students/admin/exams/results/results-legend

In Semester Mark Out of 60	Exam Mark Percentage	Overall Mark	Final Mark Percentage	Final Letter Grade
45	62	70	70	D
25	62	50	45	NH
20	35	34	34	N
34	45	52	52	P
50	82	83	83	HD
50	40	66	45	NH
30	46	48	48	N

Traditional Teaching Method

Lecture



First Exposure - often low student engagement

Textbook

Read Hard Stuff

Homework

See if You Know Hard Stuff

Exam

Show Knowledge Mastery

Flipped Classroom – Full Picture

Homework

First Exposure:
With resources and Feedback

T A S K S

Forum

Learn Hard Stuff:
through activities/discussion

Tutorial

Practice Knowledge Mastery

Assignments/Exam

Show Knowledge Mastery

Flipped Classroom – Scenario

- Process starts with pre-recorded videos and assigned readings followed by review activities to test understanding and provide feedback (***complete before Forum session***)
- Forum session then poses questions as part of the lesson flow
  - Forums session is online (Zoom) depending.
  - Provides an opportunity to engage with the content and *seek clarification*
  - be part of a wider discussion with your peers on the material
  - Will include polls/questions/group activities to gauge understanding
  - Completing the in-Forum activities are a key part of your learning
- Apply knowledge in ***following week's*** Tutorial sessions and complete Tutorial tasks
  - Feedback provided on attempt via sample solutions

Why Flipped Learning?

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

An overview of **D**ata**B**ase **M**anagement **S**ystems (DBMS)

The challenge

- Let’s create a system to record information on Monash students
  - student, unit and enrolment details
  - What kind of approaches do we have?
  - What kinds of problems are involved?

Pre-Database Systems

- Manual System
  - recording data on paper/cards stored (filed) in folders/cabinets
  - management (insert/update and delete of data) and reporting are slow and cumbersome
- File Processing Systems
  - recording of data in computer based files

FIGURE 1.7 CONTENTS OF THE CUSTOMER FILE

Database name: Ch01_Text

C_NAME	C_PHONE	C_ADDRESS	C_ZIP	A_NAME	A_PHONE	TP	AMT	REN
Alfred A. Ramas	615-844-2573	218 Fork Rd., Babs, TN	36123	Leah F. Hahn	615-882-1244	T1	100.00	05-Apr-2018
Leona K. Dunne	713-894-1238	Box 12A, Fox, KY	25246	Alex B. Alby	713-228-1249	T1	250.00	16-Jun-2018
Kathy W. Smith	615-894-2285	125 Oak Ln, Babs, TN	36123	Leah F. Hahn	615-882-2144	S2	150.00	29-Jan-2019
Paul F. Olowski	615-894-2180	217 Lee Ln., Babs, TN	36123	Leah F. Hahn	615-882-1244	S1	300.00	14-Oct-2018
Myron Orlando	615-222-1672	Box 111, New, TN	36155	Alex B. Alby	713-228-1249	T1	100.00	28-Dec-2018
Amy B. O'Brian	713-442-3381	387 Troll Dr., Fox, KY	25246	John T. Okon	615-123-5589	T2	850.00	22-Sep-2018
James G. Brown	615-297-1228	21 Tye Rd., Nash, TN	37118	Leah F. Hahn	615-882-1244	S1	120.00	25-Mar-2019
George Williams	615-290-2556	155 Maple, Nash, TN	37119	John T. Okon	615-123-5589	S1	250.00	17-Jul-2018
Anne G. Farriss	713-382-7185	2119 Elm, Crew, KY	25432	Alex B. Alby	713-228-1249	T2	100.00	03-Dec-2018
Olette K. Smith	615-297-3809	2782 Main, Nash, TN	37118	John T. Okon	615-123-5589	S2	500.00	14-Mar-2019

C_NAME = Customer name
C_PHONE = Customer phone
C_ADDRESS = Customer address
C_ZIP = Customer zip code

A_NAME = Agent name
A_PHONE = Agent phone
TP = Insurance type
AMT = Insurance policy amount, in thousands of $
REN = Insurance renewal date

FIGURE 1.8 CONTENTS OF THE AGENT FILE

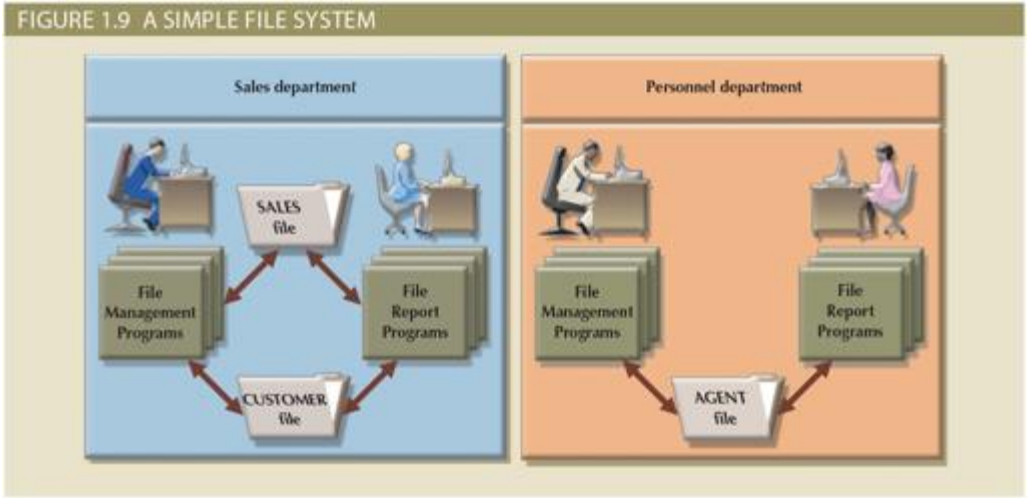
Database name: Ch01_Text

A_NAME	A_PHONE	A_ADDRESS	ZIP	HIRED	YTD_PAY	YTD_FIT	YTD_FICA	YTD_SLS	DEP
Alex B. Alby	713-228-1249	123 Toll, Nash, TN	37119	01-Nov-2000	26566.24	6641.56	2125.30	132737.75	3
Leah F. Hahn	615-882-1244	334 Main, Fox, KY	25246	23-May-1986	32213.78	8053.44	2577.10	138967.35	0
John T. Okon	615-123-5589	452 Elm, New, TN	36155	15-Jun-2005	23198.29	5799.57	1855.86	127093.45	2

A_NAME = Agent name
A_PHONE = Agent phone
A_ADDRESS = Agent address
ZIP = Agent zip code
HIRED = Agent date of hire

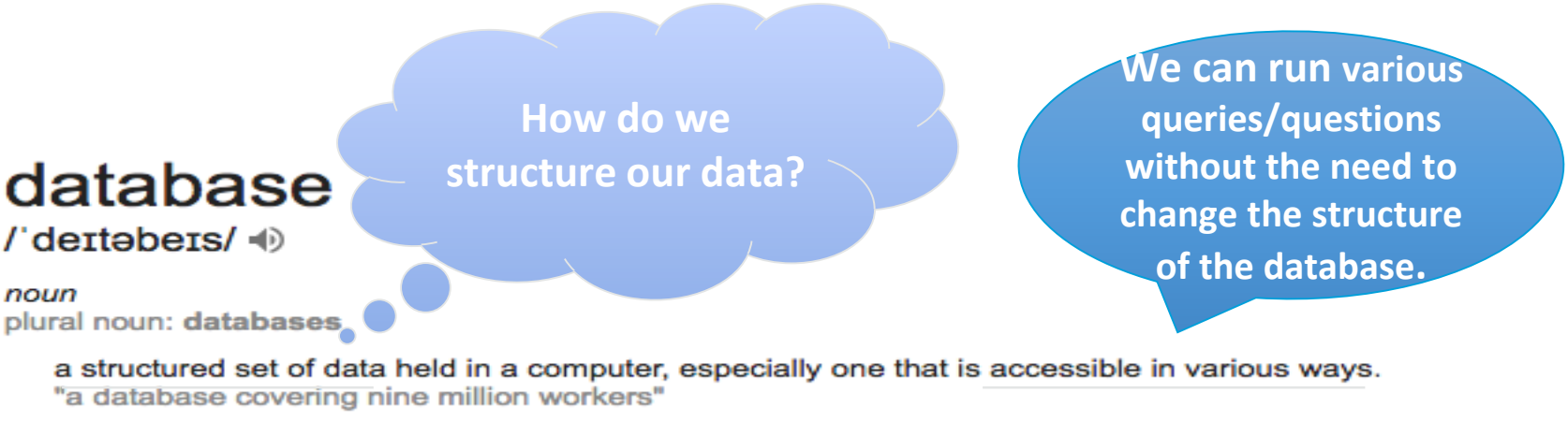
YTD_PAY = Year-to-date pay
YTD_FIT = Year-to-date federal income tax paid
YTD_FICA = Year-to-date Social Security taxes paid
YTD_SLS = Year-to-date sales
DEP = Number of dependents

Problems with file processing systems



- Data duplication, leads to inconsistent data
- Program and data dependence
- Lack of security and limited data sharing (islands of information)
- Lengthy development times, difficulty of getting quick answers
  - Extensive programming needed

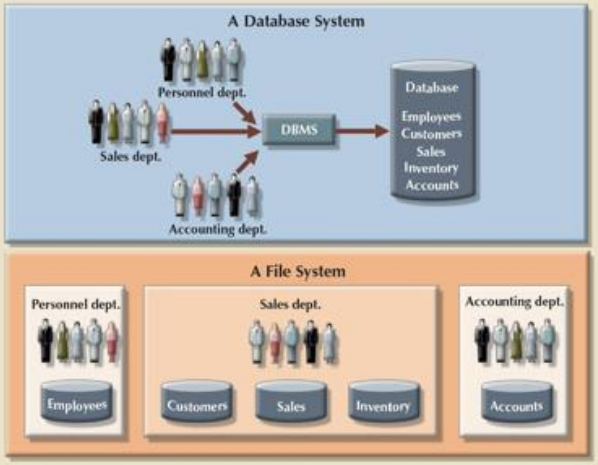
What is a database?



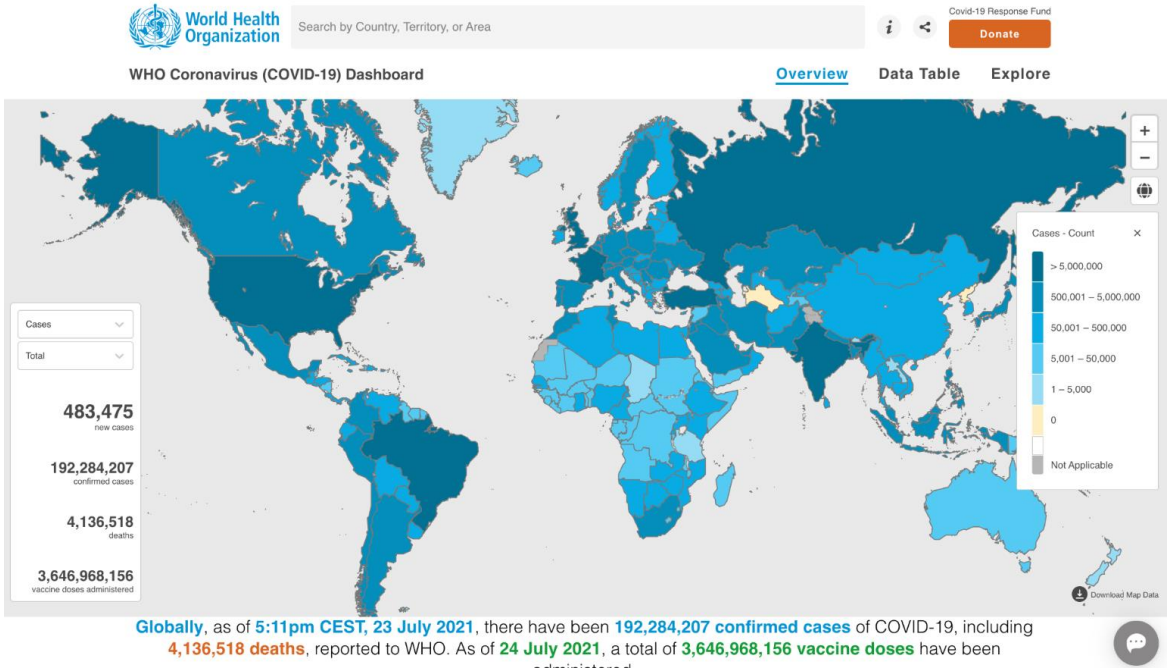
A database

- Logically related data stored in a single logical data repository (the Database)
  - the repository may be stored on one local computer, distributed or in the cloud
  - stores data structures, relationships between structures, and access paths
  - defines, stores, and manages all access paths and components

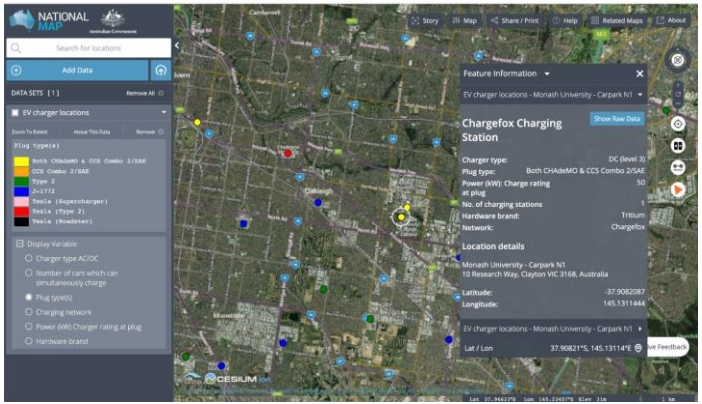
FIGURE 1.10 CONTRASTING DATABASE AND FILE SYSTEMS



Database Visualisations



https://covid19.who.int/



https://nationalmap.gov.au/

Types of database

- Hierarchical
- Network
- Relational *
- Object Oriented/ Object Relational
- XML/Hybrid
- No SQL

* Unit focus

TABLE 2.1

EVOLUTION OF MAJOR DATA MODELS

GENERATION	TIME	DATA MODEL	EXAMPLES	COMMENTS
First	1960s–1970s	File system	VMS/VSAM	Used mainly on IBM mainframe systems Managed records, not relationships
Second	1970s	Hierarchical and network	IMS, ADABAS, IDS-II	Early database systems Navigational access
Third	Mid-1970s	Relational	DB2 Oracle MS SQL Server MySQL	Conceptual simplicity Entity relationship (ER) modeling and support for relational data modeling
Fourth	Mid-1980s	Object-oriented Object/relational (O/R)	Versant Objectivity/DB DB2 UDB Oracle 12c	Object/relational supports object data types Star Schema support for data warehousing Web databases become common
Fifth	Mid-1990s	XML Hybrid DBMS	dbXML Tamino DB2 UDB Oracle 12c MS SQL Server	Unstructured data support O/R model supports XML documents Hybrid DBMS adds object front end to relational databases Support large databases (terabyte size)
Emerging Models: NoSQL	Early 2000s to present	Key-value store Column store	SimpleDB (Amazon) BigTable (Google) Cassandra (Apache) MongoDB Riak	Distributed, highly scalable High performance, fault tolerant Very large storage (petabytes) Suited for sparse data Proprietary application programming interface (API)

Question. Which of the following is not a database type:

A. Hierarchical
B. Network
C. Oracle
D. Relational
E. No SQL

Question. Which database management systems (DBMS) are you most familiar with?:

A. Oracle
B. MySQL
C. MS Access
D. SQL Server
E. Others
F. I am not familiar with any of these database systems

Data Management Today

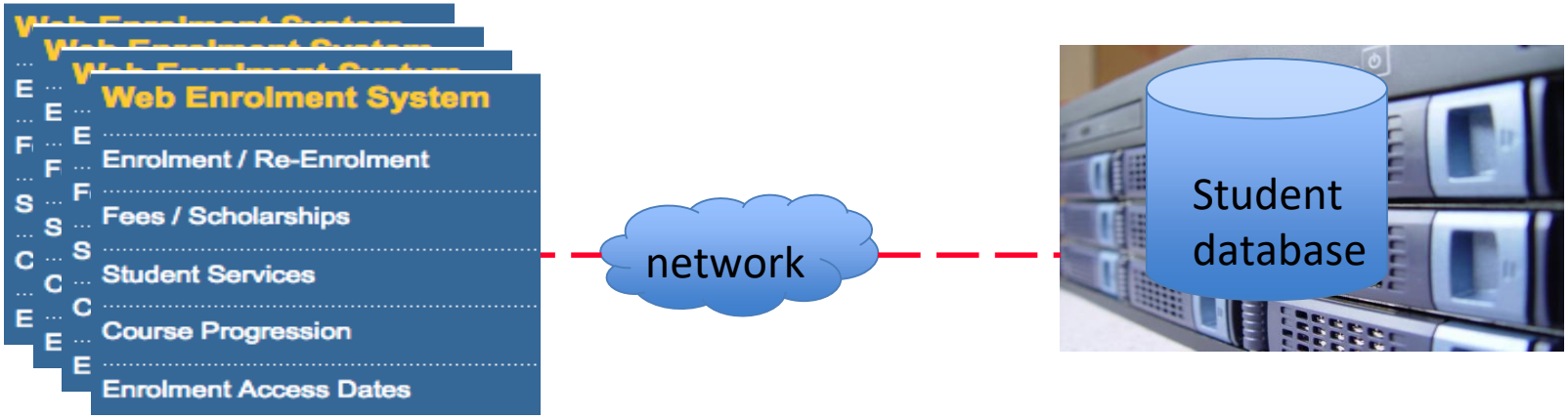
- Relational databases are still very popular. But …
  - –Social Networks (Facebook, Twitter, Foursquare etc.)
  - –Multimedia data (YouTube, Pinterest, Facebook etc.)
  - –Data streams (Twitter, computer networks)
  - –Spatial data (Road networks, Google Earth, Space etc.)
  - –Web data
  - –Big Data

https://www.domo.com/learn/infographic/data-never-sleeps-8#/

RANK	DBMS	TYPE	INTRODUCED
1	ORACLE	Commercial, Relational DBMS	1979
2	MySQL	Open source, Relational DBMS	1995
3	Microsoft SQL Server	Commercial, Relational DBMS	1989
4	PostgreSQL	Open source, Relational DBMS	1996
5	mongoDB	Open Source, NoSQL - Document Store	2009
6	redis	Open Source, NoSQL - Key Value	2013

DB-ENGINES July 2021

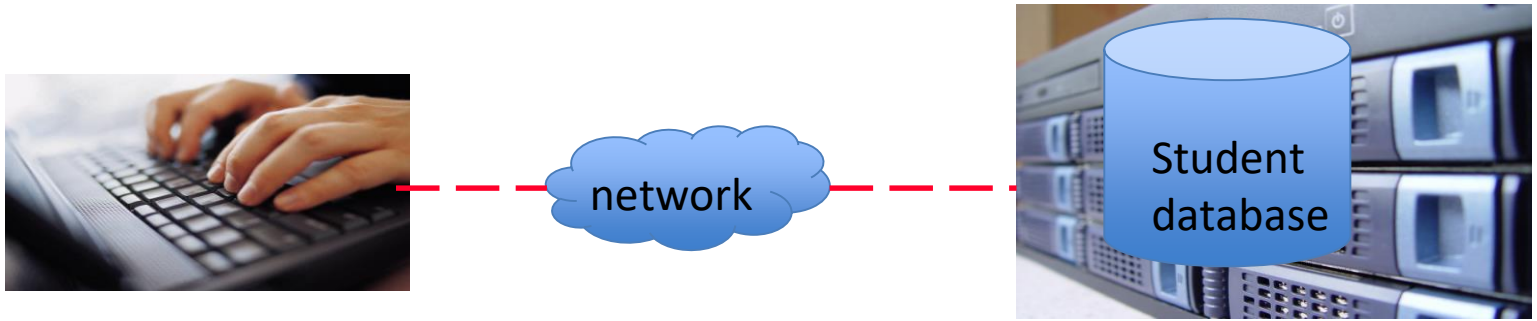
Relational database systems in action: End-users' view



Front end application (client)

Student Database is implemented in an Oracle DBMS (server)

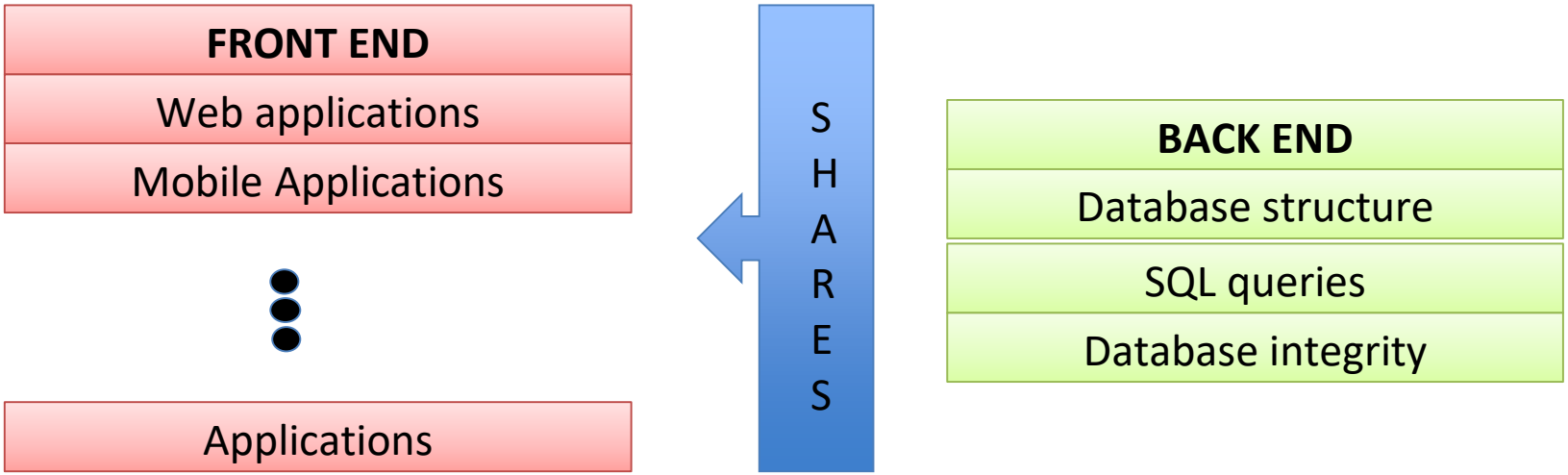
Database Systems in Action
Developers' View



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.

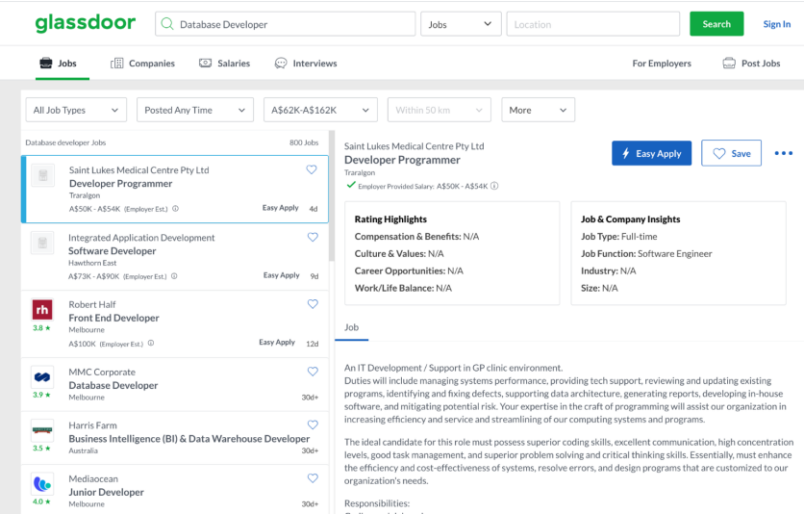
Database Careers

TABLE 1.3

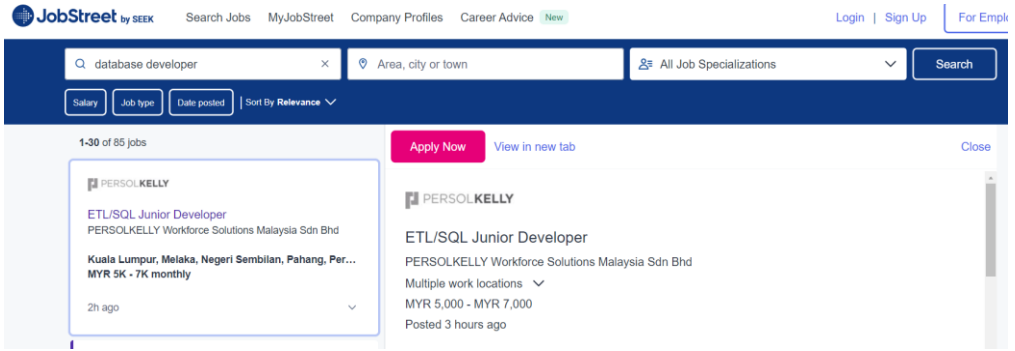
DATABASE CAREER OPPORTUNITIES

JOB TITLE	DESCRIPTION	SAMPLE SKILLS REQUIRED
Database Developer	Create and maintain database-based applications	Programming, database fundamentals, SQL
Database Designer	Design and maintain databases	Systems design, database design, SQL
Database Administrator	Manage and maintain DBMS and databases	Database fundamentals, SQL, vendor courses
Database Analyst	Develop databases for decision support reporting	SQL, query optimization, data warehouses
Database Architect	Design and implementation of database environments (conceptual, logical, and physical)	DBMS fundamentals, data modeling, SQL, hardware knowledge, etc.
Database Consultant	Help companies leverage database technologies to improve business processes and achieve specific goals	Database fundamentals, data modeling, database design, SQL, DBMS, hardware, vendor-specific technologies, etc.
Database Security Officer	Implement security policies for data administration	DBMS fundamentals, database administration, SQL, data security technologies, etc.
Cloud Computing Data Architect	Design and implement the infrastructure for next-generation cloud database systems	Internet technologies, cloud storage technologies, data security, performance tuning, large databases, etc.
Data Scientist	Analyze large amounts of varied data to generate insights, relationships, and predictable behaviors	Data analysis, statistics, advanced mathematics, SQL, programming, data mining, machine learning, data visualization

Database Careers



https://www.glassdoor.com.au/Job/database-developer-jobs-SRCH_KO0,18.htm



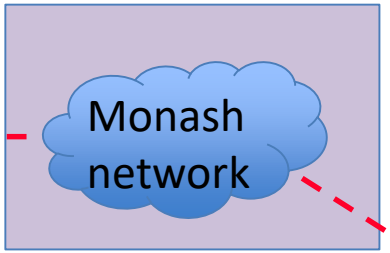
https://www.jobstreet.com.my/en/job-search/database-developer-jobs/

Question. What is the Operating System on your main computer?

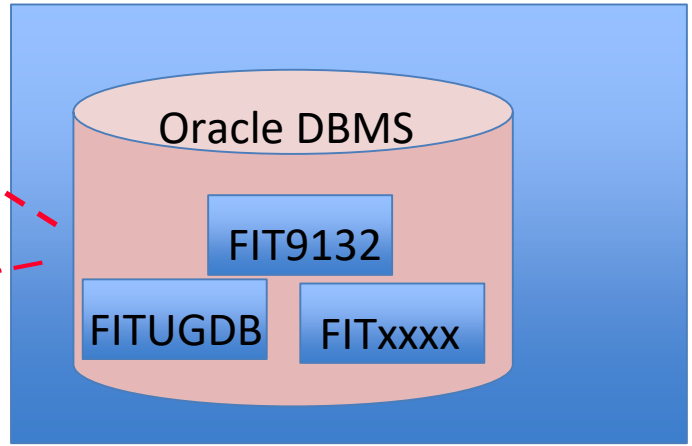
A. Windows 11/10
B. Mac OS
C. Other

Our Database Systems Environment as covered in Applied Sessions

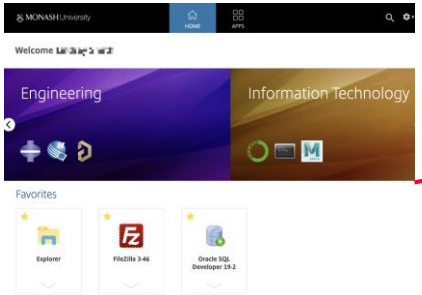
Local install of SQL Developer
***and* Monash Virtual Private Network (VPN)**



ora-fit.ocio.monash.edu

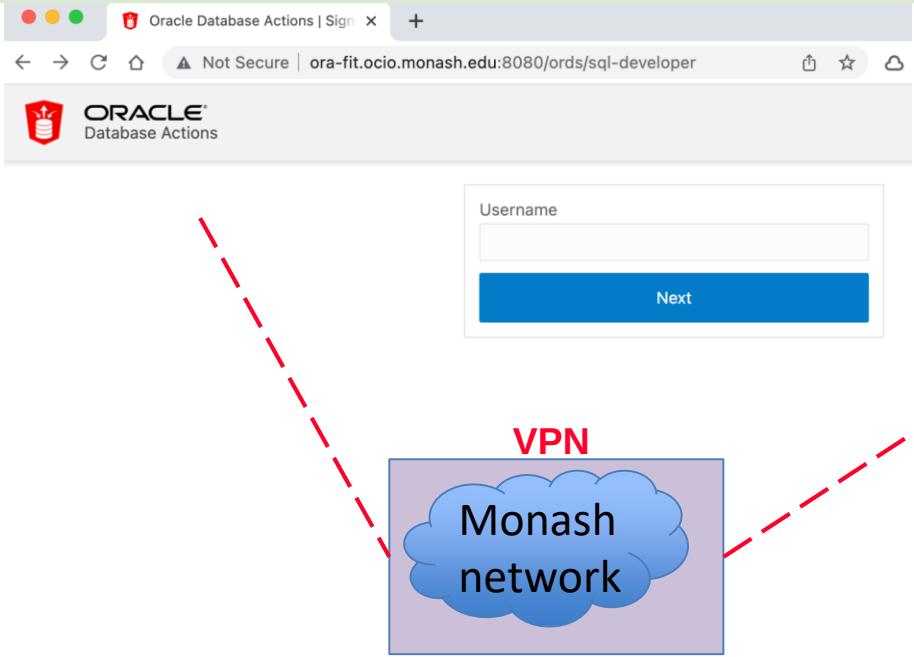


OR
Monash MoVE SQL Developer



Another way to access the Monash Oracle Database

http://ora-fit.ocio.monash.edu:8080/ords/sql-developer



Problems with installing during week 1

Special Software HelpDesk sessions (Online) will run next week (week 2)