CSIT115 L5
Basic Concepts
Data model ? What is it ?
A data model provides an abstract view of data that can be used for datadefinition, data manipulation, data retrieval, and data administration

Because a data model provides an abstract view it is also commonly called as a view of data
In the past we talked about the following views of data:

- Sector, track, cylinder
- Sequence of data blocks
- Record, file, file system
- Two dimensional tables (tabular view), Hierarchies (tree view), Networks (graph view)
- Classes of objects, associations, attributes

What view of data provides Relational Model of Data ?
The model provide a tabular view of data

- A relational table consists of a header and theoretically an unlimited number of rows
- A header consists of a sequence of attribute names
- A row consists of a sequence of values of attributes
- A vertical sequence of attribute name followed by the attribute values is called a column
- A header is also called a relational schema
- A set of all values of an attribute is called a domain of an attribute
- A database is a set of relational tables

anum	fname	lname	dob	city	state	phone
1	Harry	Potter	1980-12-12	Perth	Western Australia	645278453
2	Johnny	Walker	1990-01-1	Geelong	Victoria	63569784
3	Mary	Poppins	1950-01-01	Melbourne	Victoria	62389541
4	Michael	Collins	1960-05-25	Brisbane	Queensland	63336666
5	Margaret	Finch	1953-12-07	Sydney	New South Wales	64573489
6	Claudia	Kowalewski	1959-05-03	Hobart	Tasmania	64577744
7	James	Bond	1960-01-01	Perth	Western Australia	645[illegible]78434
8	Stephen	Staunton	1977-10-23	Freemantle	Western Australia	NULL
9	Joseph	Staunton	1977-10-23	Newcastle	New South Wales	623778453
10	John	Spiderman	1990-06-21	Sydney	New South Wales	24256789
11	George	ThePirst	1991-10-12	Melbourne	Victoria	NULL
12	Homer	Simpson	1957-05-24	Adelaide	South Australia	61369876
13	Neil	Superman	1960-07-20	Perth	Western Australia	45672345
14	Ivan	TheTerrible	1969-05-11	Brisbane	Queensland	123567898
15	Penelope	Princess	1977-10-23	Hobart	Tasmania	40076711
16	Zhi Chao	Zhong	1971-07-21	Horsley	New South Wales	86150189
17	Richard	TheLionheart	1981-06-02	Waga Waga	New South Wales	61234567
18	Sherlock	Holmes	1935-06-13	Bundaberg	Queensland	46676601
19	Robin	Hood	1951-08-21	Horsley	New South Wales	86150329
20	Janusz	Getta	1953-10-03	Horsley	New South Wales	12345678

Keys
Examples:

- A set of attributes {snum} is a minimal key in a relational schema STUDENT={snum, first-name, last-name, date-of-birth}
- A set of attributes {snum, last-name} is a superkey in a relational schema STUDENT={snum, first-name, last-name, date-of-birth}

All minimal keys valid in a relational schema are also called as candidate keys
A primary key is one of the candidate keys arbitrarily chosen by a database designer to uniquely identify the rows in a relational table

NULL
A NULL constraint says that an attribute in a relational table may have no values at all

With an exception saying that no column belonging to a primary key or candidate key is allowed to take on NULL for any row (it is also called as Entity Integrity constraint)

Domain Constraints
A domain constraint is a condition imposed on the values of an attribute
A that determines the values of dom(A), i.e. a domain of attribute A.
Examples:

- An attribute student-number is a sequence of 7 digits
- An attribute date-of-birth cannot have a value greater then todays date
- An attribute salary is a positive real number
- A value of an attribute gender can be either 'female' or 'male'
- A value of an attribute credits can be either 6 or 12
- A value of an attribute first-name is a string of letters an blanks that starts from a capital letter

Summary
A database is a collection of relational tables
A relational table consists of rows (tuples) and columns (attributes)
All attributes have atomic values
Each attribute has a domain, it means, that a set of acceptable values
A row represents a relationship among a set of attributes
A relational table is a subset of the Cartesian Product of attribute domains
An attribute may have no value (NULL)
A relational table implements either a class of objects or an association
All identifiers in a conceptual schema are implemented as the keys in the relational tables

A "tourist guide" through a "land of keys"

- Minimal key => the smallest key
- Superkey => minimal key + other attribute(s)
- Candidate key => any minimal key
- Primary key => one of candidate keys
- Foreign key => an attribute or set of attributes referencing a primary key or a candidate key in another or the same relational table