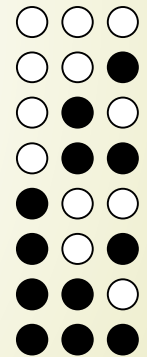
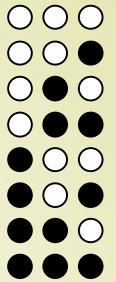


Features of relational databases

Unit 18 Database Design
Extended Diploma in ICT

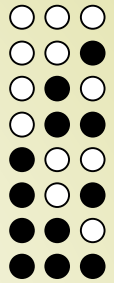




Entities

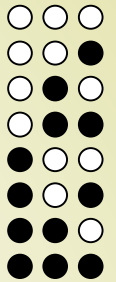
- An entity is thing or object of importance about which we will store data.
- Examples are:
 - Car, Student, Product, Transaction, Tax payer
- An entity normally has one table in the database

Attribute



- An attribute describes a property of the entity
- For the entity Car, the attributes could be:
 - VIN (vehicle identification number)
 - Colour
 - Engine size
 - Fuel type
- An attribute is a column in the table and the value of the attribute is stored in the field in the column

Tables



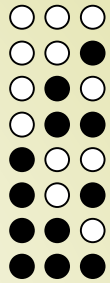
tblCAR

Entity

Attribute

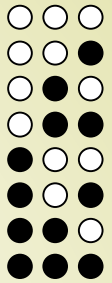
VIN	Colour	Engine Size	Fuel Type
1M8GDM9A8KP042788	Blue	1499	Petrol

Attribute
value



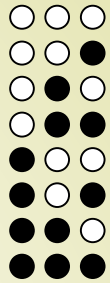
Data types – MS Access

- Short text (default)
 - Use for text or combinations of text and numbers, such as addresses, or for numbers that do not require calculations, such as phone numbers, part numbers, or postal codes.
 - Stores up to 255 characters. The FieldSize property controls the maximum number of characters that can be entered.
- Long text
 - Use for lengthy text and numbers, such as notes or descriptions.
 - Stores up to 65,536 characters.
- Number
 - Use for data to be included in mathematical calculations, except calculations involving money (use Currency type).
 - Use for foreign keys if the original key (i.e. Primary key in the home table) is autonumber
 - Stores 1, 2, 4, or 8 bytes. The FieldSize property defines the specific Number type.




Data types – MS Access

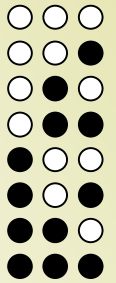
- **Date/Time**
 - Use for dates and times.
 - Scroll down to format and choose appropriate option
 - Stores 8 bytes.
- **Currency**
 - Use for currency values and to prevent rounding off during calculations.
 - Stores 8 bytes.
- **AutoNumber**
 - Use for unique sequential (incrementing by 1) such as a primary key, or random numbers that are automatically inserted when a record is added.
 - Stores 4 bytes



Data types – MS Access

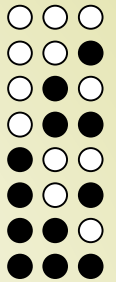
- Yes/No
 - Use for data that can be only one of two possible values, such as Yes/No, True/False, On/Off. Null values are not allowed.
 - Appears as check boxes:
 - Stores 1 bit.
- OLE Object
 - Use for OLE objects (such as Microsoft Word documents, Microsoft Excel spreadsheets, pictures, sounds, or other binary data) that were created in other programs using the OLE protocol.
 - Stores up to 1 gigabyte (limited by disk space).
- Hyperlink
 - Use for hyperlinks. A hyperlink can be a UNC path or a URL.
 - Stores up to 64,000 characters

Keys



- The relationship between tables is defined by keys
- A primary key is an attribute which uniquely identifies each record in a table
- Tables can be linked by foreign key
- A foreign key is the key in one table which is the primary key in the related table

Keys



Primary Key

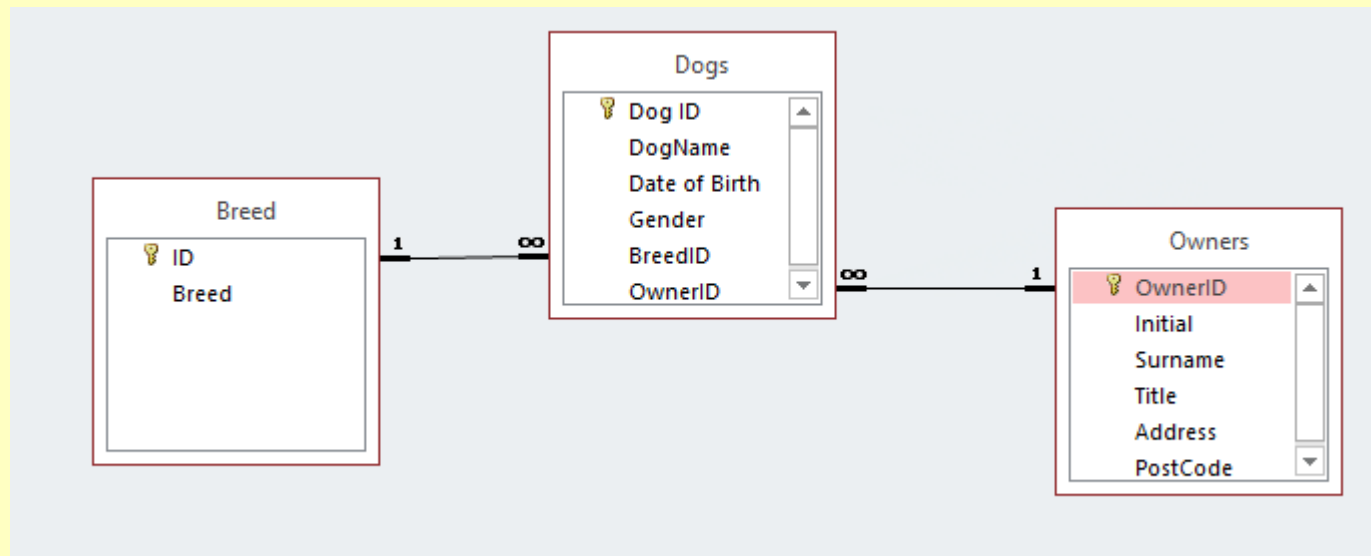
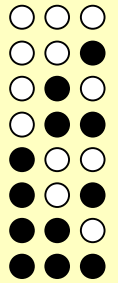
Primary Key

Foreign Key

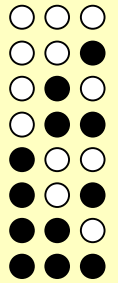
ID	Initial	Surname	Title	Address	Postcode
1	A	Smith	Mrs	4 High St, Hereford	HR1 1ZX
2	C	Miles	Mr	72 Castle Road, Ledbury	HR7 AA

DogID	Dog Name	Gender	DOB	Breed	ID
1	Ant	M	21/08/02	Alsatian	1
2	Dec	M	21/08/02	Alsatian	1
3	Jordan	F	08/08/04	Terrier	1
4	Rooney	M	23/10/05	Poodle	1
5	Fang	M	14/03/07	Chihuahua	2

Setting up relationships



Setting up relationships



Database tools;
Relationships
link Primary key to foreign key

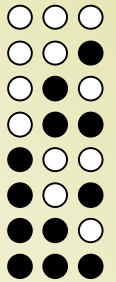
Edit Relationships

Table/Query:	Related Table/Query:
Breed	Dogs
ID	BreedID

Enforce Referential Integrity
 Cascade Update Related Fields
 Cascade Delete Related Records

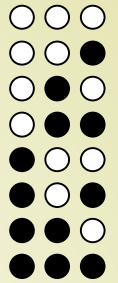
Relationship Type: One-To-Many

Buttons: OK, Cancel, Join Type.., Create New..



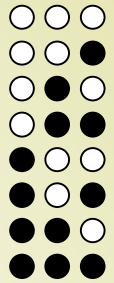
Referential integrity

- The value of a foreign key must be a value of the primary key in the related table
- When all the values match in all the tables, then the database has referential integrity



Referential integrity - rules

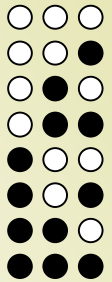
- Must be enforced
 1. Cannot add a record to a table (tbl2) unless the foreign key to be used already exists as a primary key in the other table (tbl1).
 2. If a record is deleted for a primary key in tbl1 then all corresponding records with that foreign key must be deleted in tbl2.{cascading delete}
 3. If the primary key for a record in tbl1 is altered then all the corresponding records in tbl2 must be changed. {cascading update}



Validation

- Validation controls the entry of data into the database. (design view, field properties)
- A validation mask can be set to capitalise all names, for instance
 - To force the first letter of a name to a capital
 - Input mask : >L<????????????????????
 - Where:
 - > makes what follows uppercase
 - L requires a letter
 - < makes what follows lower case
 - ? Letters are optional (digits not allowed)
 - So wiLliAms becomes Williams

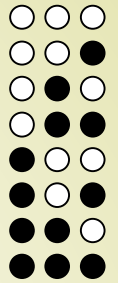
General		Lookup
Field Size	255	
Format		
Input Mask	>L<???????	
Caption		
Default Value		
Validation Rule		
Validation Text		
Required	No	
Allow Zero Length	Yes	
Indexed	No	
Unicode Compression	Yes	
IME Mode	No Control	
IME Sentence Mode	None	
Text Align	General	



Validation

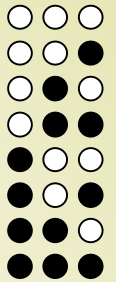
- Rules can be used on data entry to check if the data is valid
 - Date of birth should be before today
 - Validation Rule: < Date()
 - Validation Text: Enter a date prior to today
 - The text will be shown if the date entered is today or in the future.

General	Lookup
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	< Date()
Validation Text	DOB must be before today.
Required	No
Indexed	No
IME Mode	No Control
IME Sentence Mode	None
Text Align	General
Show Date Picker	For dates



Assessment (Criteria P1)

- Prepare a presentation (up to 10 slides) which explains:
 - How business information can be represented using entities and attributes
 - How entities can be related to each other using primary and foreign keys
 - What is meant by referential integrity
 - How data can be validated when entered into a database
- Provide examples



Assessment (Criteria M1)

- Extend your presentation (up to 8 more slides) and explain:
 - How referential integrity is set in a database
 - What errors are detected when referential integrity is set
 - How these errors can be corrected
 - How data can be recovered from multiple tables by the use of the primary and foreign keys
- Provide examples. Submit to **L3U18A1**