Week5: First Tutorial

- Validation rules: Error handling after the fact

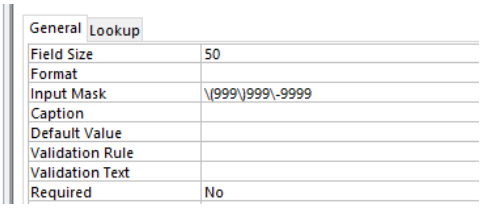
What You Should Know: Error Prevention

- The mechanism for doing this are Input Masks
- Input masks vs. Validation rules
  - Timing: input masks can prevent errors from occurring (e.g. only enter numeric input), validation rules are used to react after the user has entered erroneous information (e.g. by providing a helpful error message)
  - Input masks are rules to specify the format of data,
  - Validation rules can do that and more (e.g., verify that data falls within a certain range).
  - Sometimes a format rule may be slightly easier to define with an input mask which is why input masks exist.

Author: James Tam

Where/How To Enter Validation Rules

- As usual switch to “Design view” since this affects the design of a table.
- Scroll down to the general tab



General | Lookup

Field Size	50
Format	
Input Mask	\(999\)999\-9999
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No

- Validation rule: rules to handle input outside the valid range or to specify the required format.
- Validation text: where the error message can be entered.

Author: James Tam

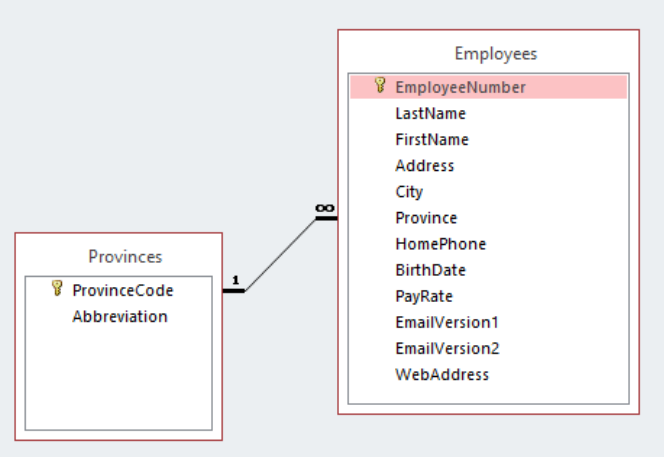
Validation Text

- Example (details of how to specify the rule is coming up)

Validation Text	Rate must be in the range from $10 - $100

Author: James Tam

Example Database



Attributes which need additional error handling:

1. Pay rate
2. Birthdate
3. Email
4. Web address

Author: James Tam

Pay Rate: Step Version 1 (Avoid Too Low)

- Data requirement:
- Pay cannot be negative

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Pay Rate: Step Version 2 (Avoid Too High)

- Data requirement:
- Pay cannot exceed $100

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Pay Rate: Step Version 3 (Both Conditions Included)

- Data requirement:
- Rate must be in the range from $10 - $100

Author: James Tam

Date Information

- Similar to how strings in Excel are enclosed in quotes
  - "String"
- Date information in Access must be enclosed in a pair of number signs
  - Format: #*month*>/<*day*>/<*year*><#
  - Example: #12/31/1999#

Author: James Tam

Birthdate: Step Version 1 (Avoid Too Low)

- Data requirement:
- Age cannot be greater than that of the oldest person (say it's 118 years). Based on the year 2016 that would mean that the year of birth cannot be earlier than the end of 1898.

Author: James Tam

Birthdate: Step Version 2 (Avoid Too High And Too Low)

- Data requirement:
- Date must be between Jan 1 1900 and December 31 2007

Author: James Tam

Birthdate: "Born In The Future?"

- Data requirement:
- Date of birth cannot be in the future

- The `now()` function can be employed in this case

Author: James Tam

Email: Version 1

- Format requirement:
- Must be in the form <*at least one alpha*> <*any number of characters*> at sign <*at least one alpha*> <*any number of characters*> and end in .ca

- Note:
  - This requires the use of the multi-character wildcard: *
  - This character cannot be used in this fashion with an Input mask!
  - Entering 'star' into an Input mask results in *

  - Q: What does star-slash do?

Author: James Tam

Email Version 2

- Format requirement:
- Must be in the form <at least one alpha> <any number of characters> at sign <at least one alpha> <any number of characters> and end in one of the following .ca, .com, .org

Author: James Tam

(Wonky) Web Address

- Format requirement:
- Must be in the form <www> . <1 numerical digit> <any number of characters> and end in .com

Author: James Tam

Student Exercise 1: TA Gives You 5 Minutes

- **Exercise 1**: Web address
- Format requirement:
- Must be in the form www dot <at least one alpha> <any number of any char> .ca

Author: James Tam

Student Exercise 2: TA Gives You 5 Minutes

- **Exercise 2**: Web domain
- Format requirement:
  - Must end in dot-ca OR dot-com

Author: James Tam

Student Exercise 3: TA Gives You 5 Minutes

- **Exercise 3**: WebAddressCanadaCommerical
- Format requirement:
  - www dot <*at least one alpha*> <*any number of any char*> .ca OR .com suffix

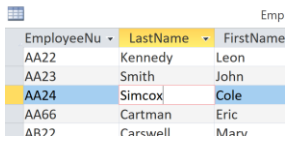
Author: James Tam

Week5: Second Tutorial

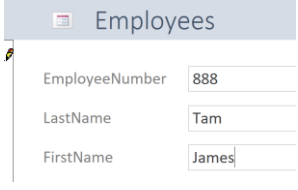
- Creating a graphical form
- Database normalization and design rules

Graphical Database Forms

- An alternative to having the user enter information enter database records using the generic DataSheet view:
  - DataSheet view



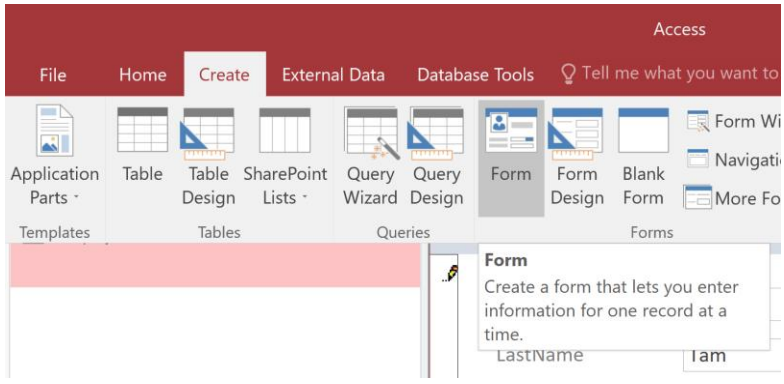
  - Graphical form view of Access



Author: James Tam

Creating A Form

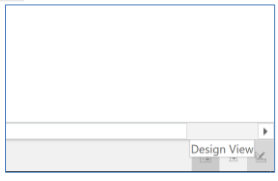
- Select a table and then under the 'create' table select 'form'



Author: James Tam

New Form Created

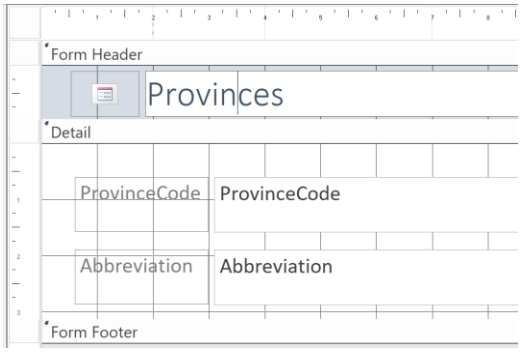
Select "Design View" (bottom right of form) to change the details of the form e.g. layout of components



Author: James Tam

Forms: Design View

- Detailed changes can be made here e.g. layout, fonts (on the 'General' tab)



Author: James Tam

Database Normalization

- Source for tutorial notes:
  - **(http://www.studytonight.com/dbms/database-normalization.php)**
- Normalization: the process of changing the design of a database.
- There are many levels ("forms") of design
- The forms that will be covered in this class (there are others as well):
  - **1NF:** The data in a one attribute should not be composite or plural e.g., a phone's attribute for a student that stores cell, home, work etc.
  - **2NF**: Every non-primary key element must be dependent on the primary key (and the entire primary key if the key is composite).
  - **3NF**: all non-key attributes must depend on the primary key only (no transitive dependencies)

Author: James Tam

Initial Table: Not In 1NF

- There is a composite attribute!

Student Table :

Student	Age	Subject
Adam	15	Biology, Maths
Alex	14	Maths
Stuart	17	Maths

Author: James Tam

Converting Initial Table To 1NF

- All attributes must contain a single piece of information ('course' rather than 'courses')

Student Table following 1NF will be :

Student	Age	Subject
Adam	15	Biology
Adam	15	Maths
Alex	14	Maths
Stuart	17	Maths

Using the First Normal Form, data redundancy increases, as there will be many columns with same data in multiple rows but each row as a whole will be unique.

Author: James Tam

Critique Of Latest Version

- It fulfills the requirements of 1NF but not 2NF

"Subject" not "Subjects", attribute is no longer composite

Student Table following 1NF will be :

Student	Age	Subject
Adam	15	Biology
Adam	15	Maths
Alex	14	Maths
Stuart	17	Maths

Using the First Normal Form, data redundancy increases, as there will be many columns with same data in multiple rows but each row as a whole will be unique.

New issue

Author: James Tam

How Does The Last Version Violate 2NF?

- Student and subject could together form a composite PK but age only depends upon student
- 2NF: attributes must depend upon the PK (or entire PK in the composite PKs

Student Table following 1NF will be :

Student	Age	Subject
Adam	15	Biology
Adam	15	Maths
Alex	14	Maths
Stuart	17	Maths

Using the First Normal Form, data redundancy increases, as there will be many columns with same data in multiple rows but each row as a whole will be unique.

Author: James Tam

Next Redesign Of The Student Table

- **Student table split into 2 tables to meet requirements of 2NF**
  - **'Students' table (Primary key = Student)**

New Student Table following 2NF will be :

Student	Age
Adam	15
Alex	14
Stuart	17

  - **'Subjects table' (Composite primary key = Student, Subject)**

New Subject Table introduced for 2NF will be :

Student	Subject
Adam	Biology
Adam	Maths
Alex	Maths
Stuart	Maths

Author: James Tam

Critique Of The Following Database

- **Table not in 3NF**
- **3NF = no transitive dependencies allowed!**
  - Non-key attributes must directly depend upon the PK and not indirectly (via another non-key attribute)
- Name, DOB depends on ID but street, city, state, zip depend on zip

Student_Detail Table :

Student_id	Student_name	DOB	Street	city	State	Zip

Author: James Tam

Previous Table Redesigned Into 3NF

- 'Student_Detail' table (PK = Student_ID, all other 3 fields directly depend on it)

New Student_Detail Table :

Student_id	Student_name	DOB	Zip

- 'Addresses' table (PK = Zip, all other 3 fields directly depend on it)

Address Table :

Zip	Street	city	state

Author: James Tam