Deliverable 2

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Project Summary

User "@history" on data.world.com provides a database[1] detailing actual witch-trials in Scotland from the late 1500s to early 1700s. 38 interrelated tables tell enthralling tales of people accused of witchcraft (presumably falsely). Each of 3220 rows in the table labeled "accused" assigns accused witches a primary key "Accused_ID" which links them to trials, ordeals, and tortures.

Due to the challenge of cataloguing comprehensive historical data, the database has empty, blank, or "dead fields" for attributes which only occasionally have known value. For example many of the accused persons have no listed age or ethnicity. Some of the fields are also subjective—most of the ages are just guesses. Each table also has columns of metadata describing when each entity was last updated, and sometimes excessively detailed information about the location of events. Therefore not every attribute of the data-set will be represented in my database.

Still, by reproducing the database ourselves and implementing it with RStudio, we can generate tables and charts which provide insight into these questions:

- What kind of person was most likely to be accused of witchcraft?
- Did men or women tend to accuse more witches?
- How could someone avoid being accused?
- What circumstances most often led to (presumably false) confessions?
- What happened to witches found guilty?

Data Dictionary

The ReadMe from @history describes the database as having three layers: Accused, Case, and Trial. Accused people have exactly one case which may involve multiple trials. To quote the ReadMe,

"Any given person accused of witchcraft could have two trials within one case. For example, Janet Cook was accused of witchcraft in 1661-62. She was tried and acquitted. But the people involved in bringing her to trial were unsatisfied with that result and brought more charges forward and retried her about a month later resulting in a verdict of guilty. For this accused witch, the verdict in her first trial did not provide an ending to her case. She was not released from prison after her initial verdict of not guilty. The two trials were still part of the same case."

[1] Julian Goodare, Lauren Martin, Joyce Miller and Louise Yeoman, 'The Survey of Scottish Witchcraft', www.arts.ed.ac.uk/witches/ (archived January 2003, accessed January 2019).

Although the abundance of tables is daunting, the data is initially well-normalized. This data dictionary contains surface-level information relevant to the ERD and deeper notes for explaining choices made in the logical model.
r = required, o = optional. u = unique. c = composite. pk = primary key, fk = foreign key.
In the original database, each entity has a primary key which is a character string of variable length, like 'Accused_Ref = A/EGD/1015'. In my database these are replaced with integer surrogate keys like 'Accused_ID = 17.' For construction purposes, the original Ref primary keys are also present in each table vestigially, just not listed here.

Entity	Attribute	Comments
Accused	**Accused_ID [rupk]**	A person accused of witchcraft. Head of the first level of the database, "Accused."
	Name [rc]	First, last, and m-first and m-last (perhaps 'maiden?'). Optional alias and title.
	Sex [r]	"Male" or "Female."
	Age [o]	Integer. Subjective and often missing.
	Location [rc]	Country, presbytery, parish, settlement, burgh, etc—more specificity than we need.
	Ethnicity [o]	Sparsely filled. Possibly, the empty spaces are for unremarkable Scots?
	Marital_Status [o]	Sparsely filled.
	Socioeconomic_Status [o]	Sparsely filled with strings like "Landless," "Lower," and "Middling."
	Occupation [o]	Sparsely filled with strings like "Servant," "Vagabond," and "Midwife."
	Notes [o]	Sparse but interesting.
Accused_Family	**Accused_Family_ID [rupk]**	Family member of accused. In the first database level, the "Accused" level.
	Accused_ID [rfk]	Foreign key referencing the accused.
	Relationship [r]	Relationship to the accused.
	Name [rc]	First, last, and optional alias and title.
	Age [o]	Integer. Subjective and often missing.
	Occupation [o]	Sparsely filled with strings like "Stabler," "Tailor," and "Workman."
Appeal	**Appeal_ID [rupk]**	Appeal to higher court. In the third database level, the "Trial" level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Central_Authority [o]	Often "Parliament," "Privy Council," or "Committee of Estates."
	Reason [o]	String of text. Surprisingly well-documented.
	Date [o]	Date of the appeal. Dates in this database are often just month/year or year.
Calendar_Custom	**Custom_ID [rupk]**	Holiday of note. In the second database level, the "Case" level.
	Case_ID [rfk]	Foreign key referencing the case.
	Custom_Type [r]	See ReadMe for a list of customs like "Easter," "Lent," and "Yule."
Case	**Case_ID [rupk]**	Each accused has one case. Head of the Case level.
	Accused_ID [rfk]	Foreign key referencing the accused.
	Start_Date [o]	Start date.
	Case_Date [r]	Case date.
	Age_at_Case [o]	Integer. Subjective and often missing.
	Case_Details [rc]	A hundred booleans like "Devil Worship" and "Political Motive."
		(I'll omit Case_Details henceforth. It mostly repeats information in other tables.)
	Notes [oc]	Sparse but informative and amusing. "Devil Notes," "Folk Notes," etc.
Case_Person	**Case_Person_ID [rupk]**	Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Person_ID [rfk]	Foreign key referencing the person.
	Involvement [o]	Title of involved person. Reliably filled.
	Notes [o]	Purpose of visit, often to witness confessions or executions.

Entity	Attribute	Comments
Commission	**Commission_ID [rupk]**	Request for warrant. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Comm [rc]	Comm_Body and Comm_Type.
	Comm_Date [o]	Very few dates missing.
	Sealed [r]	Boolean: Is it sealed with a signet?
	Notes [o]	Circumstances of commission.
Complaint	**Complaint_ID [rupk]**	Legal complaint, sometimes against family members of accused. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Accused_Family_ID [ofk]	Optional foreign key referencing family member of accused.
	Person_ID [ofk]	Optional foreign key referencing person involved.
	Complainer [r]	Relation to accused.
	Complaint_Date [o]	Date. Well-filled.
	Complaint_Place [o]	Usually the Privy Council.
Confession	**Confession_ID [rupk]**	Confession to witchcraft. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Central_Trial_Confession [r]	Boolean.
	Confession_Date [o]	Almost all entries have a date.
	Confession_Place [oc]	Optional location (like "Haddington") and specific place ("church").
Counter_Strategy	**Counter_Strategy_ID [rupk]**	How did a victim try to stop the witch? Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Type [r]	See ReadMe for a list of counter strategies like "Prayer."
Demonic_Pact	**Demonic_ID [rupk]**	Deal with a demon. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Demonic_Type [o]	Rarely missing. See ReadMe for a list of pacts like "Devil's Marks."
	Notes [o]	Describes devil's marks or other notes.
Denunciation	**Denunc_ID [rupk]**	Formal condemnation. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Denunc_Date [o]	Date of denunciation. Rarely missing, often incomplete.
	Notes [o]	Usually name of who made the denunciation, as a string.
Devil_Appearance	**Devil_ID [rupk]**	Sighting of any non-natural being. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Devil_Type [o]	Just one missing value. Usually "Male" or "Animal."
	Devil_Text [o]	More precise description.
Elf_Fairy_Elements	**Elf_Fairy_ID [rupk]**	Evidence of elves or fairies. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Elf_Fairy_Type [r]	See ReadMe for a list of types like "Changeling" and "Green."
Imprisonment	**Imprison_ID [rupk]**	Accused held in captivity. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Central_Trial_Prison [r]	A boolean, usually false.
	Imprison_Date [o]	Date, often missing or incomplete.
	Prison [o]	Depressingly, many people imprisoned in "Tolbooths."
	Location [o]	Optional location (like "Haddington").
	Fate_in_Prison [rc]	A required boolean stating if the inmate was moved, and optional description.
Linked_Trial	**(Primary key is composite.)**	A pair of related trials. Trial level.
	One_Trial_ID [rfk]	Foreign key referencing one trial.
	Two_Trial_ID [rfk]	Foreign key referencing another trial.

Entity	Attribute	Comments
Malice	**Malice_ID [rupk]**	Act of vengeance or grudge. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Cause_of_Malice [o]	Rarely missing.
Mentioned_as_a_Witch	**Mention_ID [rupk]**	A person mentioned as being a witch. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Trial_of_Accused_ID [ofk]	Foreign key referencing the accused trial. Rarely missing.
	Trial_of_Name [o]	First and last name. Rarely missing.
	Trial_Mentioned_in_ID [ofk]	Foreign key referencing the trial mentioned in. Rarely missing.
	Date_of_Mentioned_Trial [o]	Rare.
	Mention_Date [o]	Date. Sometimes missing, but always complete when present.
	Mention_Type [o]	Most often "Denounced" or "Accomplice."
	Fate_of_Mentioned_Witch [o]	Rare. Often "Burnt" or "Banished."
	Notes [o]	More notes.
Moves_to_HLA	**move_ID [rupk]**	Move to higher local authority. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Move_to [r]	Moves are sent to "Bishops" and "Presbyteries," for example.
	Move_Date [o]	About half missing or incomplete.
Musical_Instrument	**Musical_Instrument_ID [rupk]**	A musical instrument supposedly involved in witchcraft. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Musical_Instrument_Type [o]	One missing value; some entries are "Unspecified."
	Musical_Instrument_Text [o]	Sometimes clarifies Unspecified entries.
Ordeal	**Ordeal_ID [rupk]**	Experience inflicted upon supposed witches. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Ordeal_Date [o]	Many missing or incomplete dates.
	Ordeal_Type [r]	See ReadMe for a list of types like "Pricking" and "Searching."
Other_Charges	**Other_Charges_ID [rupk]**	Miscellaneous charge not mentioned elsewhere. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Other_Charges_Type [o]	"Murder," "Sorcery," etc. Some missing values.
Other_Named_Witch	**Named_Witch_ID [rupk]**	Witch mentioned in another trial. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Named_Witch_Accused_ID [ofk]	Optional foreign key referencing the named witch.
	Named_Witch_Trial_ID [ofk]	Optional foreign key referencing the relevant trial.
	Mention_Type [o]	"Denounced," "Accomplice," etc.
	Witch_Name [rc]	First and last.
	Named_Witch_Trial_Date [o]	Mostly empty.
	Notes [o]	Rare but interesting comments.
Person	**Person_ID [rupg]**	Case level by way of Case_Person, Trial level by way of Trial_Person.
	Name [rc]	First, last, and optional title like "Mr" or "of Dunscaith."
	Occupation [o]	Mostly "Ministers" and "Witch-Pricker."
	Office [o]	
	Residence [o]	Like "Bolton" and "Over Bolton."
	Notes [oc]	Notes and Other Details.
Prev_Commission	(ReadMe says this table is 'dead.')	(I'll omit it henceforth.)

Entity	Attribute	Comments
Property_Damage	**Property_Damage_ID [rubf]**	Supernatural damage to another's property. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Property_Damage_Type [o]	What was damaged, like "Crops" or "Boats."
Ref_Parish	**Parish_ID [rupk]**	Location related to local church. Unstated level.
	Parish_Name [o]	Location, like "Haddington."
	Other_Location_Data [oc]	Many entries have exhaustive location details I'm uninterested in.
Reference	(Just reference material.)	(I'll omit it henceforth.)
Religious_Motif	**Motif_ID [rupk]**	Symbol of faith. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Motif_Type [r]	See ReadMe for a list of motifs like "Cross" and "Eschatology."
Ritual_Object	**Ritual_Object_ID [rupk]**	Item supposedly used for witchcraft. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Ritual_Object_Type [r]	See ReadMe for a list of ritual objects like "Axe" and "Herb."
Shape_Changing	**Shape_Changing_ID**	A witch supposedly changing shape. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Shapechanging_Type [r]	Like "Animal" or "Apparition."
	Notes [o]	Details about the event. Few empty entries.
Source	(Just reference material.)	(I'll omit it henceforth.)
Torture	**Torture_ID [rupk]**	Experience inflicted upon supposed witches. Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Torture_Date [o]	Many entries missing, or incomplete with just month and year.
	Torture_Type [o]	Like "Whip" or "Hanging by Thumbs." Few missing entries.
Trial	**Trial_ID**	A case might have many trials. Head of trial level.
	Case_ID [rfk]	Foreign key referencing the case.
	Parish_ID [ofk]	Foreign key referencing parish, when applicable.
	Arrest [r]	Boolean. Was there an arrest?
	Arrest_Date [o]	Dates are rare and incomplete.
	Fled [r]	Boolean. Did they flee the trial?
	Fled_Date [o]	Dates are rare and incomplete.
	Action_Dropped [r]	Boolean. Was the action dropped?
	Action_Dropped_Date [o]	Dates are rare and incomplete.
	Trial_Date [o]	Dates are rare and incomplete.
	Trial_Place [o]	Only recorded when in "Tolbooths."
	Female_Accusers [r]	Integer 0 or above.
	Male_Accusers [r]	Integer 0 or above.
	Verdict [o]	Mostly empty. Values are "Guilty" and "Not Guilty," or "Not Proven."
	Sentence [o]	Mostly "Execution," "Excommunication," "Release," or "Banishment."
	Execution_Method [o]	On most executions.
	Execution_Date [o]	On most executions.
	Execution_Location [oc]	Country, burgh, and sometimes foreign key for parish.
	Trial_Notes [oc]	Space for pre-trial and post-trial notes.

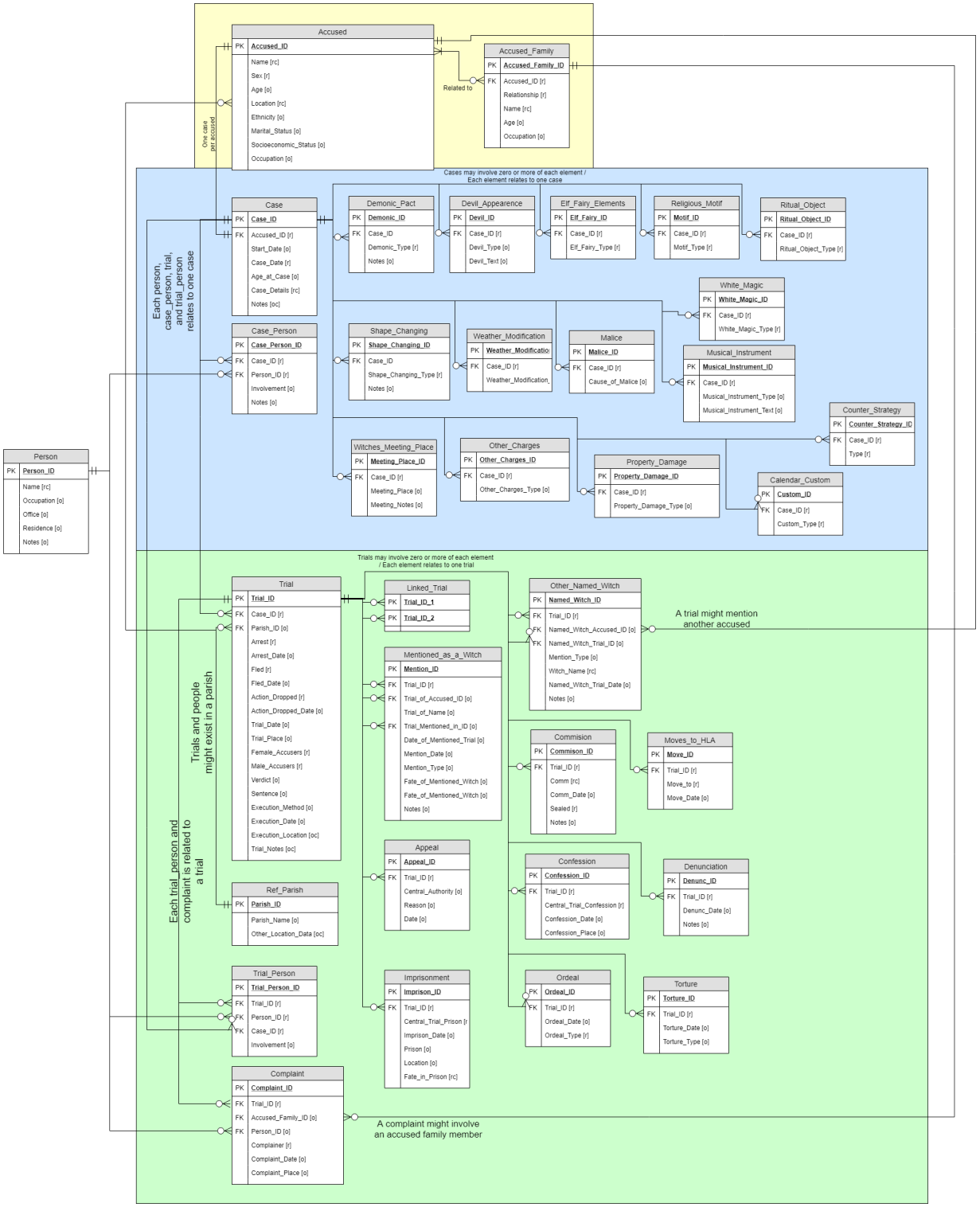
Entity	Attribute	Comments
Trial_Person	**Trial_Person_ID [rupk**	Trial level.
	Trial_ID [rfk]	Foreign key referencing the trial.
	Person_ID [rfk]	Foreign key referencing the person.
	Case_ID [rfk]	Foreign key referencing the case.
	Involvement [o]	How is this person related to the case?
Weather_Modification	**Weather_Modification_ID [rupk]**	Weather supposedly caused by a witch. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Weather_Modification_Type [o]	Only one value missing.
White_Magic	**White_Magic_ID [rupk]**	Benevolent mysticism. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	White_Magic_Type [r]	Like "Protective" or "Love Magic."
Witches_Meeting_Place	**Meeting_Place_ID**	Alleged cabal location. Case level.
	Case_ID [rfk]	Foreign key referencing the case.
	Meeting_Place [o]	Like "Yard" or "House."
	Meeting_Notes [o]	Description of meeting place.

Conceptual Model

This model might be too small to see because of the abundance of tables. (View the original file here: https://drive.google.com/file/d/157Xug4lw5WBllz0GG5UKvxZTzKkEK6k2/view?usp=sharing.)

Still, we may glean information from the model: the data's three levels are color-coded (yellow for accusations, blue for cases, and green for trials). This simplifies possible relationships: each accused has one case and each case belongs to one accused; each case may have associated elements, including people and trials; each trial may have its own elements. Climactic events like tortures and confessions can be linked to accused witches through trials and cases.

We are lucky enough that bridge entities like "Case_Person" and "Trial_Person" are pre-established.

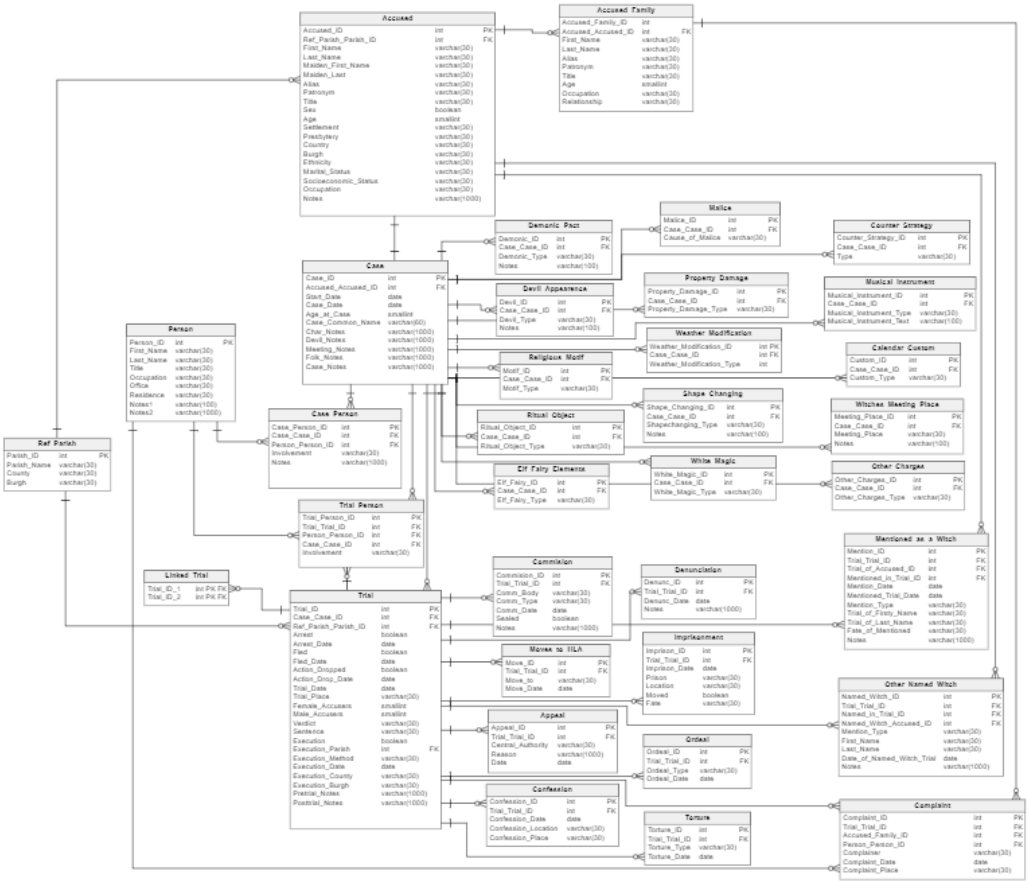

Accused
Accused_ID
Name [rc]
Sex [r]
Age [o]
Location [rc]
Ethnicity [o]
Marital_Status [o]
Socioeconomic_Status [o]
Occupation [o]
Accused_Family
Accused_Family_ID
Accused_ID [r]
Relationship [r]
Name [rc]
Age [o]
Occupation [o]
Related to
One case per accused
Cases may involve zero or more of each element / Each element relates to one case
Each person, case_person, trial, and trial_person relates to one case
Case
Case_ID
Accused_ID [r]
Start_Date [o]
Case_Date [r]
Age_at_Case [o]
Case_Details [rc]
Notes [oc]
Case_Person
Case_Person_ID
Case_ID [r]
Person_ID [r]
Involvement [o]
Notes [o]
Demonic_Pact
Demonic_ID
Case_ID
Demonic_Type [r]
Notes [o]
Devil_Appearence
Devil_ID
Case_ID [r]
Devil_Type [o]
Devil_Text [o]
Elf_Fairy_Elements
Elf_Fairy_ID
Case_ID [r]
Elf_Fairy_Type [r]
Religious_Motif
Motif_ID
Case_ID [r]
Motif_Type [r]
Ritual_Object
Ritual_Object_ID
Case_ID [r]
Ritual_Object_Type [r]
White_Magic
White_Magic_ID
Case_ID [r]
White_Magic_Type [r]
Shape_Changing
Shape_Changing_ID
Case_ID
Shape_Changing_Type [r]
Notes [o]
Weather_Modification
Weather_Modificatio
Case_ID [r]
Weather_Modification_
Malice
Malice_ID
Case_ID [r]
Cause_of_Malice [o]
Musical_Instrument
Musical_Instrument_ID
Case_ID [r]
Musical_Instrument_Type [o]
Musical_Instrument_Text [o]
Counter_Strategy
Counter_Strategy_ID
Case_ID [r]
Type [r]
Witches_Meeting_Place
Meeting_Place_ID
Case_ID [r]
Meeting_Place [o]
Meeting_Notes [o]
Other_Charges
Other_Charges_ID
Case_ID [r]
Other_Charges_Type [o]
Property_Damage
Property_Damage_ID
Case_ID [r]
Property_Damage_Type [o]
Calendar_Custom
Custom_ID
Case_ID [r]
Custom_Type [r]
Person
Person_ID
Name [rc]
Occupation [o]
Office [o]
Residence [o]
Notes [o]
Trials may involve zero or more of each element / Each element relates to one trial
Trials and people might exist in a parish
Each trial_person and complaint is related to a trial
Trial
Trial_ID
Case_ID [r]
Parish_ID [o]
Arrest [r]
Arrest_Date [o]
Fled [r]
Fled_Date [o]
Action_Dropped [r]
Action_Dropped_Date [o]
Trial_Date [o]
Trial_Place [o]
Female_Accusers [r]
Male_Accusers [r]
Verdict [o]
Sentence [o]
Execution_Method [o]
Execution_Date [o]
Execution_Location [oc]
Trial_Notes [oc]
Linked_Trial
Trial_ID_1
Trial_ID_2
Mentioned_as_a_Witch
Mention_ID
Trial_ID [r]
Trial_of_Accused_ID [o]
Trial_of_Name [o]
Trial_Mentioned_in_ID [o]
Date_of_Mentioned_Trial [o]
Mention_Date [o]
Mention_Type [o]
Fate_of_Mentioned_Witch [o]
Fate_of_Mentioned_Witch [o]
Notes [o]
Other_Named_Witch
Named_Witch_ID
Trial_ID [r]
Named_Witch_Accused_ID [o]
Named_Witch_Trial_ID [o]
Mention_Type [o]
Witch_Name [rc]
Named_Witch_Trial_Date [o]
Notes [o]
A trial might mention another accused
Commision
Commison_ID
Trial_ID [r]
Comm [rc]
Comm_Date [o]
Sealed [r]
Notes [o]
Moves_to_HLA
Move_ID
Trial_ID [r]
Move_to [r]
Move_Date [o]
Appeal
Appeal_ID
Trial_ID [r]
Central_Authority [o]
Reason [o]
Date [o]
Confession
Confession_ID
Trial_ID [r]
Central_Trial_Confession [r]
Confession_Date [o]
Confession_Place [o]
Denunciation
Denunc_ID
Trial_ID [r]
Denunc_Date [o]
Notes [o]
Ref_Parish
Parish_ID
Parish_Name [o]
Other_Location_Data [oc]
Trial_Person
Trial_Person_ID
Trial_ID [r]
Person_ID [r]
Case_ID [r]
Involvement [o]
Imprisonment
Imprison_ID
Trial_ID [r]
Central_Trial_Prison [r
Imprison_Date [o]
Prison [o]
Location [o]
Fate_in_Prison [rc]
Ordeal
Ordeal_ID
Trial_ID [r]
Ordeal_Date [o]
Ordeal_Type [r]
Torture
Torture_ID
Trial_ID [r]
Torture_Date [o]
Torture_Type [o]
Complaint
Complaint_ID
Trial_ID [r]
Accused_Family_ID [o]
Person_ID [o]
Complainer [r]
Complaint_Date [o]
Complaint_Place [o]
A complaint might involve an accused family member

Logical Model

Thankfully, although the data is varied and bountiful, it's already quite well-normalized: there are no multivalue entries, and dependant values are separated into a frankly troublesome number of tables.

One point which might eventually cause concern is categorical fields filled with strings, like holidays on the table "Calendar_Custom." We might prefer to make a new table, "Calendar_Custom_Type," for succinctly relating common holidays to keys we can reference, instead of typing the holiday names repeatedly. This would also prevent issues with inconsistency like writing "yule" instead of "Yule." However, on the off-chance that, for example, an accused witch was tortured in a creative new way demanding a custom string, we wouldn't want to limit ourselves to the accepted forms of torture listed in a "Torture_Type" table. Therefore the logical map is not much different from the conceptual map.

The following table was produced in vertabelo, at
https://my.vertabelo.com/doc/M7Oo75Ya2jr7l01vBGfQVaP0YOEkWRce.



Database Construction

This code was automatically generated by vertabelo, but I made numerous changes by hand. For example, I initially underestimated how many characters could be in a person's name; some accused have first-names more than 30 characters long.

```
-- Created by Vertabelo (http://vertabelo.com)
-- Last modification date: 2019-02-18 20:35:27.117

-- tables
-- Table: Accused
CREATE TABLE Accused (
    Accused_ID int identity NOT NULL,
Accused_Ref varchar(30) NOT NULL,
    Parish_ID int  NULL,
    First_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Last_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Maiden_First_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Maiden_Last_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Alias varchar(30)  NULL,
    Patronym varchar(30)  NULL,
    Title varchar(30)  NULL,
    Sex bit  NOT NULL DEFAULT 0,
    Age smallint  NULL,
    Settlement varchar(30)  NOT NULL DEFAULT 'Unknown',
    Presbytery varchar(30)  NOT NULL DEFAULT 'Unknown',
    County varchar(30)  NOT NULL DEFAULT 'Unknown',
    Burgh varchar(30)  NOT NULL DEFAULT 'Unknown',
    Ethnicity varchar(30)  NOT NULL DEFAULT 'Unknown',
    Marital_Status varchar(30)  NOT NULL DEFAULT 'Unknown',
    Socioeconomic_Status varchar(30)  NOT NULL DEFAULT 'Unknown',
    Occupation varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(8000)  NULL,
    CONSTRAINT Accused_ID PRIMARY KEY (Accused_ID)
);

-- Table: Accused_Family
CREATE TABLE Accused_Family (
    Accused_Family_ID int identity NOT NULL,
Accused_Family_Ref varchar(30) NOT NULL,
    Accused_ID int  NOT NULL,
    Relationship varchar(30)  NOT NULL DEFAULT 'Unknown',
    First_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    Last_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    "Alias" varchar(30)  NULL,
    Patronym varchar(30)  NULL,
    Title varchar(30)  NULL,
```

```
    Age smallint  NULL,
    Occupation varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Accused_Family_pk PRIMARY KEY (Accused_Family_ID)
);

-- Table: Appeal
CREATE TABLE Appeal (
    Appeal_ID int identity NOT NULL,
Appeal_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Central_Authority varchar(30)  NOT NULL DEFAULT 'Unknown',
    Reason varchar(1000)  NOT NULL DEFAULT 'Unknown',
    Date date  NULL,
    CONSTRAINT Appeal_pk PRIMARY KEY (Appeal_ID)
);

-- Table: Calendar_Custom
CREATE TABLE Calendar_Custom (
    Custom_ID int identity NOT NULL,
Custom_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Custom_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Calendar_Custom_pk PRIMARY KEY (Custom_ID)
);

-- Table: theCase
CREATE TABLE "theCase" (
    Case_ID int identity NOT NULL,
    Case_Ref varchar(30) NOT NULL,
    Accused_ID int  NULL,
    Start_Date date  NULL,
    Case_Date date  NULL,
    Age_at_Case smallint  NULL,
    Case_Common_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Char_Notes varchar(8000)  NULL,
Disease_Notes varchar(8000) NULL,
Other_Maleficia_Notes varchar(8000) NULL,
    Devil_Notes varchar(8000)  NULL,
    Meeting_Notes varchar(8000)  NULL,
    Folk_Notes varchar(8000)  NULL,
    Case_Notes varchar(8000)  NULL,
    CONSTRAINT Case_pk PRIMARY KEY (Case_ID)
);

-- Table: Case_Person
CREATE TABLE Case_Person (
```

```
    Case_Person_ID int identity NOT NULL,
Case_Person_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Person_ID int  NULL,
    Involvement varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(1000)  NULL,
    CONSTRAINT Case_Person_pk PRIMARY KEY (Case_Person_ID)
);

-- Table: Commission
CREATE TABLE Commission (
    Commission_ID int identity NOT NULL,
Commission_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Comm_Body varchar(60)  NOT NULL DEFAULT 'Unknown',
    Comm_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Comm_Date date  NULL,
    Sealed bit  NOT NULL DEFAULT 0,
    Notes varchar(1000)  NULL,
    CONSTRAINT Commission_pk PRIMARY KEY (Commission_ID)
);

-- Table: Complaint
CREATE TABLE Complaint (
    Complaint_ID int identity NOT NULL,
Complaint_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Accused_Family_ID int  NULL,
    Person_ID int  NULL,
    Complainer varchar(30)  NOT NULL DEFAULT 'Unknown',
    Complaint_Date date  NULL,
    Complaint_Place varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Complaint_pk PRIMARY KEY (Complaint_ID)
);

-- Table: Confession
CREATE TABLE Confession (
    Confession_ID int identity NOT NULL,
Confession_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Confession_Date date  NULL,
    Confession_Location varchar(30)  NOT NULL DEFAULT 'Unknown',
    Confession_Place varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Confession_pk PRIMARY KEY (Confession_ID)
);
```

```
-- Table: Counter_Strategy
CREATE TABLE Counter_Strategy (
    Counter_Strategy_ID int identity NOT NULL,
Counter_Strategy_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Counter_Strategy_pk PRIMARY KEY (Counter_Strategy_ID)
);

-- Table: Demonic_Pact
CREATE TABLE Demonic_Pact (
    Demonic_ID int identity NOT NULL,
Demonic_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Demonic_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(100)  NULL,
    CONSTRAINT Demonic_Pact_pk PRIMARY KEY (Demonic_ID)
);

-- Table: Denunciation
CREATE TABLE Denunciation (
    Denunc_ID int identity NOT NULL,
Denunc_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Denunc_Date date  NULL,
    Notes varchar(1000)  NULL,
    CONSTRAINT Denunciation_pk PRIMARY KEY (Denunc_ID)
);

-- Table: Devil_Appearence
CREATE TABLE Devil_Appearence (
    Devil_ID int identity NOT NULL,
Devil_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Devil_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(100)  NULL,
    CONSTRAINT Devil_Appearence_pk PRIMARY KEY (Devil_ID)
);

-- Table: Elf_Fairy_Elements
CREATE TABLE Elf_Fairy_Elements (
    Elf_Fairy_ID int identity NOT NULL,
Elf_Fairy_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Elf_Fairy_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Elf_Fairy_Elements_pk PRIMARY KEY (Elf_Fairy_ID)
```

```
);

-- Table: Imprisonment
CREATE TABLE Imprisonment (
    Imprison_ID int identity NOT NULL,
Imprison_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Imprison_Date date  NULL,
    Prison varchar(30)  NOT NULL DEFAULT 'Unknown',
    Location varchar(30)  NOT NULL DEFAULT 'Unknown',
    Moved bit NOT NULL DEFAULT 0,
    Fate varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Imprisonment_pk PRIMARY KEY (Imprison_ID)
);

-- Table: Linked_Trial
CREATE TABLE Linked_Trial (
    Linked_Trial_ID int identity NOT NULL,
    Trial_ID_1 int  NOT NULL,
    Trial_ID_2 int  NOT NULL,
    CONSTRAINT Linked_Trial_pk PRIMARY KEY (Linked_Trial_ID)
);

-- Table: Malice
CREATE TABLE Malice (
    Malice_ID int identity NOT NULL,
Malice_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Cause_of_Malice varchar(60)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Malice_pk PRIMARY KEY (Malice_ID)
);

-- Table: Mentioned_as_a_Witch
CREATE TABLE Mentioned_as_a_Witch (
    Mention_ID int identity NOT NULL,
Mention_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Trial_of_Accused_ID int  NULL,
    Mentioned_in_Trial_ID int  NULL,
    Mention_Date date  NULL,
    Mentioned_Trial_Date date  NULL,
    Mention_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Trial_of_First_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    Trial_of_Last_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    Fate_of_Mentioned varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(1000)  NULL,
```

```
    CONSTRAINT Mentioned_as_a_Witch_pk PRIMARY KEY (Mention_ID)
);

-- Table: Moves_to_HLA
CREATE TABLE Moves_to_HLA (
    Move_ID int identity NOT NULL,
Move_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Move_to varchar(30)  NOT NULL DEFAULT 'Unknown',
    Move_Date date  NULL,
    CONSTRAINT Moves_to_HLA_pk PRIMARY KEY (Move_ID)
);

-- Table: Musical_Instrument
CREATE TABLE Musical_Instrument (
    Musical_Instrument_ID int identity NOT NULL,
Musical_Instrument_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Musical_Instrument_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Musical_Instrument_Text varchar(100)  NULL,
    CONSTRAINT Musical_Instrument_pk PRIMARY KEY (Musical_Instrument_ID)
);

-- Table: Ordeal
CREATE TABLE Ordeal (
    Ordeal_ID int identity NOT NULL,
Ordeal_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Ordeal_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Ordeal_Date date  NULL,
    CONSTRAINT Ordeal_pk PRIMARY KEY (Ordeal_ID)
);

-- Table: Other_Charges
CREATE TABLE Other_Charges (
    Other_Charges_ID int identity NOT NULL,
Other_Charges_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Other_Charges_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Other_Charges_pk PRIMARY KEY (Other_Charges_ID)
);

-- Table: Other_Named_Witch
CREATE TABLE Other_Named_Witch (
    Named_Witch_ID int identity NOT NULL,
Named_Witch_Ref varchar(30) NOT NULL,
```

```
    Trial_ID int  NOT NULL,
    Named_in_Trial_ID int  NULL,
    Named_Witch_Accused_ID int  NULL,
    Mention_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    First_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    Last_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    Date_of_Named_Witch_Trial date  NULL,
    Notes varchar(1000)  NULL,
    CONSTRAINT Other_Named_Witch_pk PRIMARY KEY (Named_Witch_ID)
);

-- Table: Person
CREATE TABLE Person (
    Person_ID int identity NOT NULL,
Person_Ref varchar(30) NOT NULL,
    First_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Last_Name varchar(60)  NOT NULL DEFAULT 'Unknown',
    Title varchar(60)  NULL,
    Occupation varchar(60)  NOT NULL DEFAULT 'Unknown',
    Office varchar(60)  NULL,
    Residence varchar(60)  NOT NULL DEFAULT 'Unknown',
    Notes1 varchar(1000)  NULL,
    Notes2 varchar(8000)  NULL,
    CONSTRAINT Person_pk PRIMARY KEY (Person_ID)
);

-- Table: Property_Damage
CREATE TABLE Property_Damage (
    Property_Damage_ID int identity NOT NULL,
Property_Damage_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Property_Damage_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Property_Damage_pk PRIMARY KEY (Property_Damage_ID)
);

-- Table: Ref_Parish
CREATE TABLE Ref_Parish (
    Parish_ID int identity NOT NULL,
Parish_Ref varchar(30) NOT NULL,
    Parish_Name varchar(30)  NOT NULL DEFAULT 'Unknown',
    County varchar(30)  NOT NULL DEFAULT 'Unknown',
    Burgh varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Ref_Parish_pk PRIMARY KEY (Parish_ID)
);

-- Table: Religious_Motif
```

```
CREATE TABLE Religious_Motif (
    Motif_ID int identity NOT NULL,
Motif_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Motif_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Religious_Motif_pk PRIMARY KEY (Motif_ID)
);

-- Table: Ritual_Object
CREATE TABLE Ritual_Object (
    Ritual_Object_ID int identity NOT NULL,
Ritual_Object_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Ritual_Object_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Ritual_Object_pk PRIMARY KEY (Ritual_Object_ID)
);

-- Table: Shape_Changing
CREATE TABLE Shape_Changing (
    Shape_Changing_ID int identity NOT NULL,
Shape_Changing_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Shapechanging_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(100)  NULL,
    CONSTRAINT Shape_Changing_pk PRIMARY KEY (Shape_Changing_ID)
);

-- Table: Torture
CREATE TABLE Torture (
    Torture_ID int identity NOT NULL,
Torture_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Torture_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    Torture_Date date  NULL,
    CONSTRAINT Torture_pk PRIMARY KEY (Torture_ID)
);

-- Table: Trial
CREATE TABLE Trial (
    Trial_ID int identity NOT NULL,
    Trial_Ref varchar(30) NOT NULL,
    Case_ID int  NULL,
    Parish_ID int  NULL,
    Arrest bit  NOT NULL DEFAULT 0,
    Arrest_Date date  NULL,
    Fled bit  NOT NULL DEFAULT 0,
```

```
    Fled_Date date  NULL,
    Action_Dropped bit  NOT NULL DEFAULT 0,
    Action_Drop_Date date  NULL,
    Trial_Date date  NULL,
    Trial_Place varchar(30)  NOT NULL DEFAULT 'Unknown',
    Female_Accusers smallint  NOT NULL DEFAULT 0,
    Male_Accusers smallint  NOT NULL DEFAULT 0,
    Verdict varchar(30)  NOT NULL DEFAULT 'Unknown',
    Sentence varchar(30)  NULL,
    Execution bit  NOT NULL DEFAULT 0,
    Execution_Parish_ID int  NULL,
    Execution_Method varchar(30)  NULL,
    Execution_Date date  NULL,
    Execution_County varchar(30)  NULL,
    Execution_Burgh varchar(30)  NULL,
    Pretrial_Notes varchar(8000)  NULL,
    Posttrial_Notes varchar(8000)  NULL,
    CONSTRAINT Trial_pk PRIMARY KEY (Trial_ID)
);

-- Table: Trial_Person
CREATE TABLE Trial_Person (
    Trial_Person_ID int identity NOT NULL,
Trial_Person_Ref varchar(30) NOT NULL,
    Trial_ID int  NOT NULL,
    Person_ID int  NULL,
    Case_ID int  NOT NULL,
    Involvement varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Trial_Person_pk PRIMARY KEY (Trial_Person_ID)
);

-- Table: Weather_Modification
CREATE TABLE Weather_Modification (
    Weather_Modification_ID int identity NOT NULL,
Weather_Modification_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Weather_Modification_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
    CONSTRAINT Weather_Modification_pk PRIMARY KEY (Weather_Modification_ID)
);

-- Table: White_Magic
CREATE TABLE White_Magic (
    White_Magic_ID int identity NOT NULL,
White_Magic_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    White_Magic_Type varchar(30)  NOT NULL DEFAULT 'Unknown',
```

```
    CONSTRAINT White_Magic_pk PRIMARY KEY (White_Magic_ID)
);

-- Table: Witches_Meeting_Place
CREATE TABLE Witches_Meeting_Place (
    Meeting_Place_ID int identity NOT NULL,
Meeting_Place_Ref varchar(30) NOT NULL,
    Case_ID int  NOT NULL,
    Meeting_Place varchar(30)  NOT NULL DEFAULT 'Unknown',
    Notes varchar(100)  NULL,
    CONSTRAINT Witches_Meeting_Place_pk PRIMARY KEY (Meeting_Place_ID)
);

-- foreign keys
-- Reference: Accused_Family_Accused (table: Accused_Family)
ALTER TABLE Accused_Family ADD CONSTRAINT Accused_Family_Accused
    FOREIGN KEY (Accused_ID)
    REFERENCES Accused (Accused_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Accused_Ref_Parish (table: Accused)
ALTER TABLE Accused ADD CONSTRAINT Accused_Ref_Parish
    FOREIGN KEY (Parish_ID)
    REFERENCES Ref_Parish (Parish_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Appeal_Trial (table: Appeal)
ALTER TABLE Appeal ADD CONSTRAINT Appeal_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Calendar_Custom_Case (table: Calendar_Custom)
ALTER TABLE Calendar_Custom ADD CONSTRAINT Calendar_Custom_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;
```

```
-- Reference: Case_Accused (table: Case)
ALTER TABLE "theCase" ADD CONSTRAINT Case_Accused
    FOREIGN KEY (Accused_ID)
    REFERENCES Accused (Accused_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Case_Person_Case (table: Case_Person)
ALTER TABLE Case_Person ADD CONSTRAINT Case_Person_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Case_Person_Person (table: Case_Person)
ALTER TABLE Case_Person ADD CONSTRAINT Case_Person_Person
    FOREIGN KEY (Person_ID)
    REFERENCES Person (Person_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Commission_Trial (table: Commission)
ALTER TABLE Commission ADD CONSTRAINT Commission_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Complaint_Accused_Family (table: Complaint)
ALTER TABLE Complaint ADD CONSTRAINT Complaint_Accused_Family
    FOREIGN KEY (Accused_Family_ID)
    REFERENCES Accused_Family (Accused_Family_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Complaint_Person (table: Complaint)
ALTER TABLE Complaint ADD CONSTRAINT Complaint_Person
    FOREIGN KEY (Person_ID)
    REFERENCES Person (Person_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
```

```
;

-- Reference: Complaint_Trial (table: Complaint)
ALTER TABLE Complaint ADD CONSTRAINT Complaint_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Confession_Trial (table: Confession)
ALTER TABLE Confession ADD CONSTRAINT Confession_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Counter_Strategy_Case (table: Counter_Strategy)
ALTER TABLE Counter_Strategy ADD CONSTRAINT Counter_Strategy_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Demonic_Pact_Case (table: Demonic_Pact)
ALTER TABLE Demonic_Pact ADD CONSTRAINT Demonic_Pact_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Denunciation_Trial (table: Denunciation)
ALTER TABLE Denunciation ADD CONSTRAINT Denunciation_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Devil_Appearence_Case (table: Devil_Appearence)
ALTER TABLE Devil_Appearence ADD CONSTRAINT Devil_Appearence_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
```

```
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Elf_Fairy_Elements_Case (table: Elf_Fairy_Elements)
ALTER TABLE Elf_Fairy_Elements ADD CONSTRAINT Elf_Fairy_Elements_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Imprisonment_Trial (table: Imprisonment)
ALTER TABLE Imprisonment ADD CONSTRAINT Imprisonment_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Linked_Trial_Trial_1 (table: Linked_Trial)
ALTER TABLE Linked_Trial ADD CONSTRAINT Linked_Trial_Trial_1
    FOREIGN KEY (Trial_ID_1)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Linked_Trial_Trial_2 (table: Linked_Trial)
ALTER TABLE Linked_Trial ADD CONSTRAINT Linked_Trial_Trial_2
    FOREIGN KEY (Trial_ID_2)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Malice_Case (table: Malice)
ALTER TABLE Malice ADD CONSTRAINT Malice_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Mentioned_as_a_Witch_Accused (table: Mentioned_as_a_Witch)
ALTER TABLE Mentioned_as_a_Witch ADD CONSTRAINT Mentioned_as_a_Witch_Accused
```

```
    FOREIGN KEY (Trial_of_Accused_ID)
    REFERENCES Accused (Accused_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Mentioned_as_a_Witch_Mention_Trial (table: Mentioned_as_a_Witch)
ALTER TABLE Mentioned_as_a_Witch ADD CONSTRAINT Mentioned_as_a_Witch_Mention_Trial
    FOREIGN KEY (Mentioned_in_Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Mentioned_as_a_Witch_Trial (table: Mentioned_as_a_Witch)
ALTER TABLE Mentioned_as_a_Witch ADD CONSTRAINT Mentioned_as_a_Witch_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Moves_to_HLA_Trial (table: Moves_to_HLA)
ALTER TABLE Moves_to_HLA ADD CONSTRAINT Moves_to_HLA_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Musical_Instrument_Case (table: Musical_Instrument)
ALTER TABLE Musical_Instrument ADD CONSTRAINT Musical_Instrument_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Ordeal_Trial (table: Ordeal)
ALTER TABLE Ordeal ADD CONSTRAINT Ordeal_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;
```

```
-- Reference: Other_Charges_Case (table: Other_Charges)
ALTER TABLE Other_Charges ADD CONSTRAINT Other_Charges_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Other_Named_Witch_Accused (table: Other_Named_Witch)
ALTER TABLE Other_Named_Witch ADD CONSTRAINT Other_Named_Witch_Accused
    FOREIGN KEY (Named_Witch_Accused_ID)
    REFERENCES Accused (Accused_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Other_Named_Witch_Named_Trial (table: Other_Named_Witch)
ALTER TABLE Other_Named_Witch ADD CONSTRAINT Other_Named_Witch_Named_Trial
    FOREIGN KEY (Named_in_Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Other_Named_Witch_Trial (table: Other_Named_Witch)
ALTER TABLE Other_Named_Witch ADD CONSTRAINT Other_Named_Witch_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Property_Damage_Case (table: Property_Damage)
ALTER TABLE Property_Damage ADD CONSTRAINT Property_Damage_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Religious_Motif_Case (table: Religious_Motif)
ALTER TABLE Religious_Motif ADD CONSTRAINT Religious_Motif_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
```

```
;

-- Reference: Ritual_Object_Case (table: Ritual_Object)
ALTER TABLE Ritual_Object ADD CONSTRAINT Ritual_Object_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Shape_Changing_Case (table: Shape_Changing)
ALTER TABLE Shape_Changing ADD CONSTRAINT Shape_Changing_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Torture_Trial (table: Torture)
ALTER TABLE Torture ADD CONSTRAINT Torture_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Case (table: Trial)
ALTER TABLE Trial ADD CONSTRAINT Trial_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Person_Case (table: Trial_Person)
ALTER TABLE Trial_Person ADD CONSTRAINT Trial_Person_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Person_Person (table: Trial_Person)
ALTER TABLE Trial_Person ADD CONSTRAINT Trial_Person_Person
    FOREIGN KEY (Person_ID)
    REFERENCES Person (Person_ID)
```

```
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Person_Trial (table: Trial_Person)
ALTER TABLE Trial_Person ADD CONSTRAINT Trial_Person_Trial
    FOREIGN KEY (Trial_ID)
    REFERENCES Trial (Trial_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Ref_Execution_Parish (table: Trial)
ALTER TABLE Trial ADD CONSTRAINT Trial_Ref_Execution_Parish
    FOREIGN KEY (Execution_Parish_ID)
    REFERENCES Ref_Parish (Parish_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Trial_Ref_Parish (table: Trial)
ALTER TABLE Trial ADD CONSTRAINT Trial_Ref_Parish
    FOREIGN KEY (Parish_ID)
    REFERENCES Ref_Parish (Parish_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Weather_Modification_Case (table: Weather_Modification)
ALTER TABLE Weather_Modification ADD CONSTRAINT Weather_Modification_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: White_Magic_Case (table: White_Magic)
ALTER TABLE White_Magic ADD CONSTRAINT White_Magic_Case
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;

-- Reference: Witches_Meeting_Place_Case (table: Witches_Meeting_Place)
ALTER TABLE Witches_Meeting_Place ADD CONSTRAINT Witches_Meeting_Place_Case
```

```
    FOREIGN KEY (Case_ID)
    REFERENCES "theCase" (Case_ID)
    --NOT DEFERRABLE
    --INITIALLY IMMEDIATE
;
```

Database Entries

I didn't write all 83,000 lines of SQL which populate the tables of my database. Instead, I wrote python programs which wrote all that SQL for me. For example, this python code produces 2,500 lines of INSERT statements defining parishes.

```
import os               # To access Excel files
import pandas as pd     # To explore Excel files

os.chdir('C:\\Users\\tedjt\\Desktop\\School\\Analysis\\WitchCraft')

refParish = 'Ref_Parish.xlsx'
ParishFile = pd.read_excel(refParish)           # Now ParishFile is a table
ParishFile = ParishFile.fillna('Unknown')       # Fill unknown entries

InsertStatement = ''                            # This will become our SQL statements

for row in range(0,ParishFile.shape[0]):        # For each row, create an insert statement
    InsertStatement += 'INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)\nVALUES ('
    Parish_Ref = '\'' + str(ParishFile.iloc[row,0]).replace('\'','\'\'') + '\','
    Parish_Name = '\'' + str(ParishFile.iloc[row,3]).replace('\'','\'\'') + '\','
    County = '\'' + str(ParishFile.iloc[row,8]).replace('\'','\'\'') + '\','
    Burgh = '\'' + str(ParishFile.iloc[row,9]).replace('\'','\'\'') + '\''
    InsertStatement += Parish_Ref + Parish_Name + County + Burgh + ');\n'

InsertStatement = InsertStatement[:-2] + ';'
    # I'm not sure this line is needed, but I'm scared to touch it

print(InsertStatement)
```

This produces Insert statements like the following:

```
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/EGD/3534','Nidrie','Unknown','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3538','Haddington','Haddington','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3539','Haddington','Unknown','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3540','Dalkeith','Unknown','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3541','Kinneil','Linlithgow','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3542','Queensferry','Unknown','Unknown');
INSERT INTO Ref_Parish (Parish_Ref,Parish_Name, County, Burgh)
VALUES ('P/JO/3543','Calder','Unknown','Unknown');
```

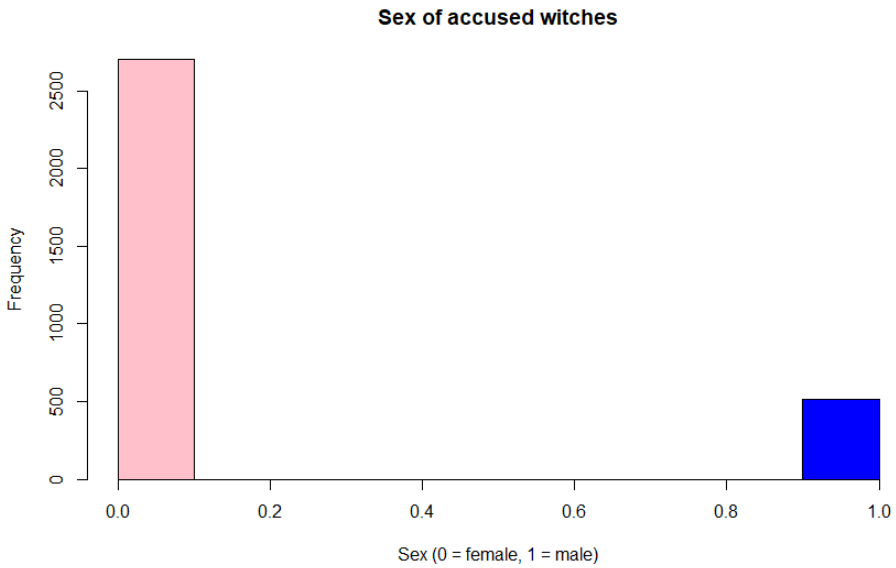
Answering Questions with Implementation in R

To answer the questions posed at the beginning of the project, I loaded the database into RStudio. Most of the tasks I needed to perform could have been achieved in SSMS using SQL operations like Count and Sum, but RStudio provided a more convenient way to manipulate the results of queries into graphs.

```
require(RODBC)          # For connecting to database
library(dplyr)          # For some helpful functions
library(ggplot2)        # For some graphing utility

myconn <- odbcConnect("WitchTrials")
```

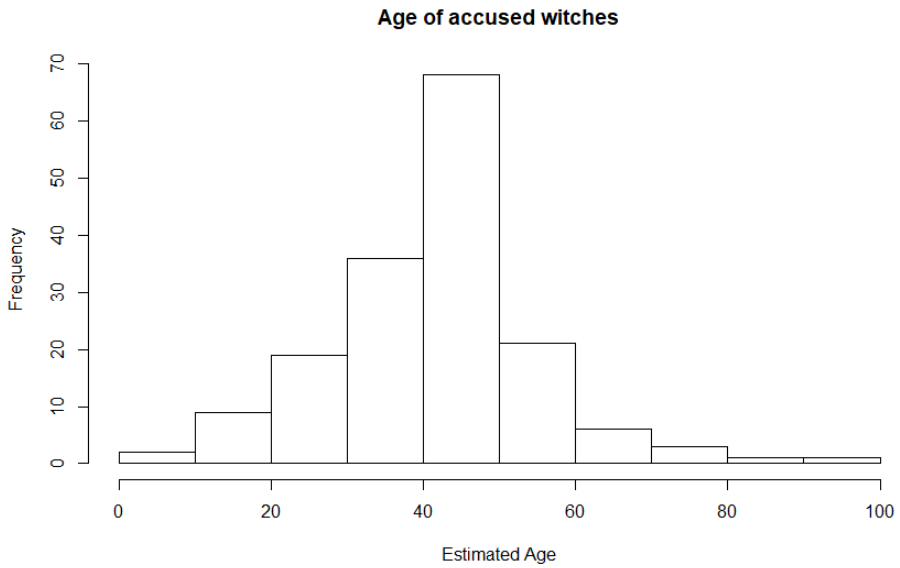
- What kind of person was most likely to be accused of witchcraft?

```
sqlSelectStatement <-
  "SELECT * FROM Accused"
sqlResult <- sqlQuery(myconn, sqlSelectStatement)

colors = c("pink","blue")
hist(sqlResult$Sex, xlab = "Sex (0 = female, 1 = male)",
    main = "Sex of accused witches",col=colors)
```



(Sex was saved as a boolean, hence the 0/1 labels.) Unsurprisingly, women were about five times more likely to be accused of witchcraft than men were.

```
hist(sqlResult$Age, xlab = "Estimated Age", main = "Age of accused witches")
```



Age of accused witches seems relatively normal, with a mode of 40 to 50 years. It's difficult to tell if this differs greatly from the age-frequency of the general historical Scottish population, especially because Age was rarely recorded and often guessed at. Still, I suspect that women over 40 were disproportionately represented as accused witches compared to their distribution in society.

```
levels(sqlResult$Title) <- c(levels(sqlResult$Title),"None")    # Add 'None' option for Title
sqlResult$Title[is.na(sqlResult$Title)] <- "None"               # Fill NA with None
count(sqlResult,Title)                                          # Count
```

Title	Frequency
Archbishop	1
Dame	1
Dr.	1
Earl	1
elder	2
6ood Wife	1
Guidwyfe	1
in Ardo	1
Lady	3
Lady Pittadrow	1
Major	1
Mistress	1
Mr	2
Mr.	1
Mrs	1
of Fowlis	1
Sir	2
sometime, Lyon King of Arms	1
younger	2
None	3194

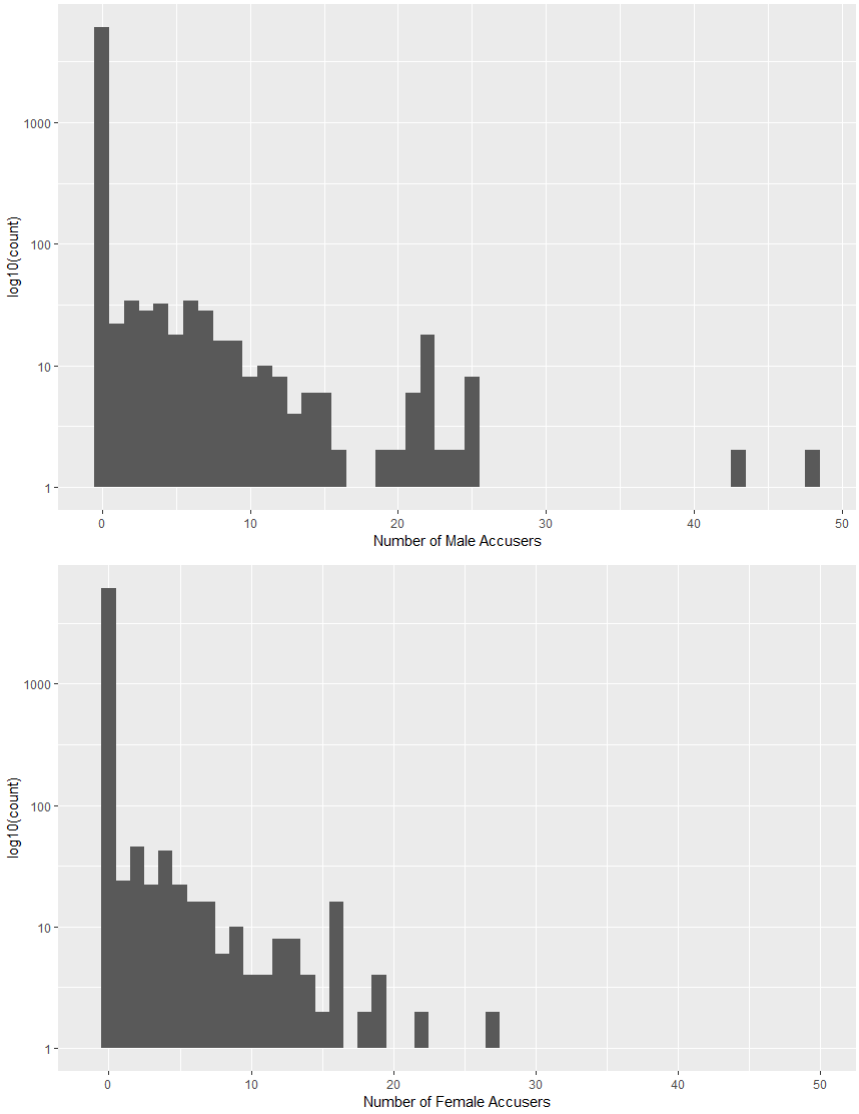
Of the thousands of accused, only 25 had a title. It seems that having a position of royalty may have staved off accusations, as if witchcraft were a poor-person's hobby. Even simple titles like "Mr." seem to have protective power.

- Did men or women tend to accuse more witches?

```
sqlSelectStatement <-
  "SELECT Male_Accusers,
    Female_Accusers
    FROM Trial
ORDER BY Male_Accusers, Female_Accusers"

sqlResult <- sqlQuery(myconn, sqlSelectStatement)

# Doubling up the data allows convenient use of log-scale.
Male_Accusers <- data.frame(c(sqlResult$Male_Accusers,sqlResult$Male_Accusers))
names(Male_Accusers) <- "Male_Accusers"

Female_Accusers <- data.frame(c(sqlResult$Female_Accusers,sqlResult$Female_Accusers))
names(Female_Accusers) <- "Female_Accusers"
```

On the next page we generate two histograms.

```
ggplot(Male_Accusers, aes(x = Male_Accusers)) + geom_histogram(binwidth=1) + scale_y_log10() +
    ylab("log10(count)") +xlab("Number of Male Accusers")

ggplot(Female_Accusers, aes(x = Female_Accusers)) + geom_histogram(binwidth=1) + scale_y_log10() +
    ylab("log10(count)") +xlab("Number of Female Accusers") + scale_x_continuous(limits=(c(-1,50)))
```



From the distinctly bimodal distribution of the upper histogram, it appears men were more likely than women to band together and accuse witches in large groups. However, the difference is fairly small; the histograms look largely similar except for outliers.

- How could someone avoid being accused?

```
sqlSelectStatement <-
  "SELECT * FROM Ritual_Object"

sqlResult <- sqlQuery(myconn, sqlSelectStatement)
objects <- count(sqlResult,Ritual_Object_Type)          # Count object frequency
objects <- objects[order(-objects$n),]                  # I display only the top 46 below
```

	Ritual Object Type	n
1	Water	60
2	Wax/clay images	47
3	Stones	33
4	Hair	28
5	Herb	26
6	Thread	25
7	Blood (animal)	24
8	Cloth	23
9	Bone	22
10	Fire	22
11	Salt	20
12	Shirt	16
13	Flesh	14
14	Cat	12
15	Bannock	11
16	Belt	9
17	Nail trimmings	9
18	Sieve	8
19	Corpse	7
20	Toad	7
21	Egg	6
22	Elfshot	6
23	Bird (dead)	5

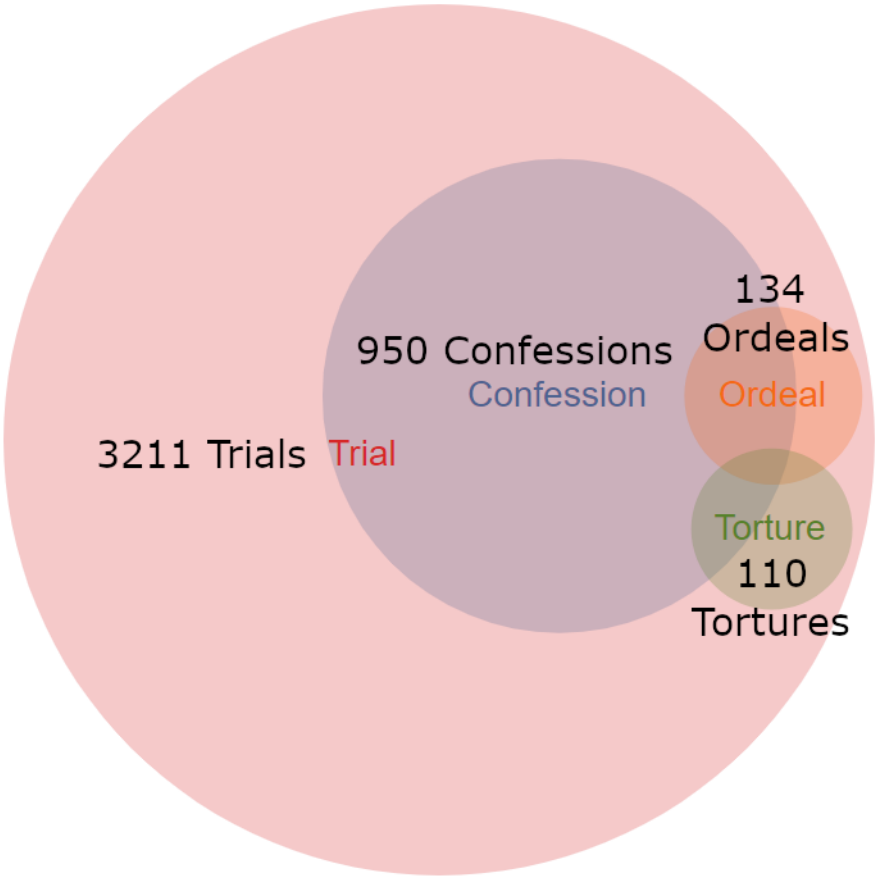
	Ritual Object Type	n
24	Knife	5
25	Meal	5
26	Snake skin	5
27	Straw	5
28	Tree	5
29	Yarn	5
30	Branch	4
31	Butter	4
32	Coal	4
33	Hand (dead)	4
34	Pin	4
35	Urine (stale)	4
36	Wax	4
37	Wheat	4
38	Aqua Vitae	3
39	Coin	3
40	Corpse powder	3
41	Earth	3
42	Feathers	3
43	Frog	3
44	Plant	3
45	Powder	3
46	Shears	3

Unfortunately, avoiding objects associated with witchcraft seems almost impossible. Some supposed ritual objects are obviously occult (animal blood, corpses, toads, frogs, dead hands) while others seem more mundane (stones, cloth, eggs, knives, trees, yarn, butter, coins, shears). It seems increasingly clear that accusations of witchcraft were (perhaps unconsciously) aimed at dis-empowering women on the fringe of society. Associating witches with cats makes it easier to claim that the local crazy cat-lady is abusing the dark arts.

- What circumstances most often led to (presumably false) confessions?

```
sqlSelectStatement <-
  "SELECT Trial.Trial_ID,Confession_ID, Ordeal_Type, Torture_Type FROM Trial
FULL JOIN Confession ON Confession.Trial_ID = Trial.Trial_ID
FULL JOIN Ordeal ON Ordeal.Trial_ID = Trial.Trial_ID
FULL JOIN Torture ON Torture.Trial_ID = Trial.Trial_ID"
# Using full joins means we can compare trials with tortures to trials without, etc

sqlResult <- sqlQuery(myconn, sqlSelectStatement)

# The number of rows in each of these tables will clarify the extent of overlap
ConfessTorture <- sqlResult[!(is.na(sqlResult$Confession_ID)) & !(is.na(sqlResult$Torture_Type)),]
ConfessNoTorture <- sqlResult[!(is.na(sqlResult$Confession_ID)) & is.na(sqlResult$Torture_Type),]
NoConfessTorture <- sqlResult[is.na(sqlResult$Confession_ID) & !(is.na(sqlResult$Torture_Type)),]
NoConfessNoTorture <- sqlResult[is.na(sqlResult$Confession_ID) & is.na(sqlResult$Torture_Type),]

ConfessOrdeal <- sqlResult[!(is.na(sqlResult$Confession_ID)) & !(is.na(sqlResult$Ordeal_Type)),]
ConfessNoOrdeal <- sqlResult[!(is.na(sqlResult$Confession_ID)) & is.na(sqlResult$Ordeal_Type),]
NoConfessOrdeal <- sqlResult[is.na(sqlResult$Confession_ID) & !(is.na(sqlResult$Ordeal_Type)),]
NoConfessNoOrdeal <- sqlResult[is.na(sqlResult$Confession_ID) & is.na(sqlResult$Ordeal_Type),]

OrdealTorture <- sqlResult[!(is.na(sqlResult$Torture_Type)) & !(is.na(sqlResult$Ordeal_Type)),]
ConfessOrdealTorture <- sqlResult[!(is.na(sqlResult$Confession_ID)) &
    !(is.na(sqlResult$Torture_Type)) & !(is.na(sqlResult$Ordeal_Type)),]
```

I applied the number of rows in each table to a venn-diagram creator online.

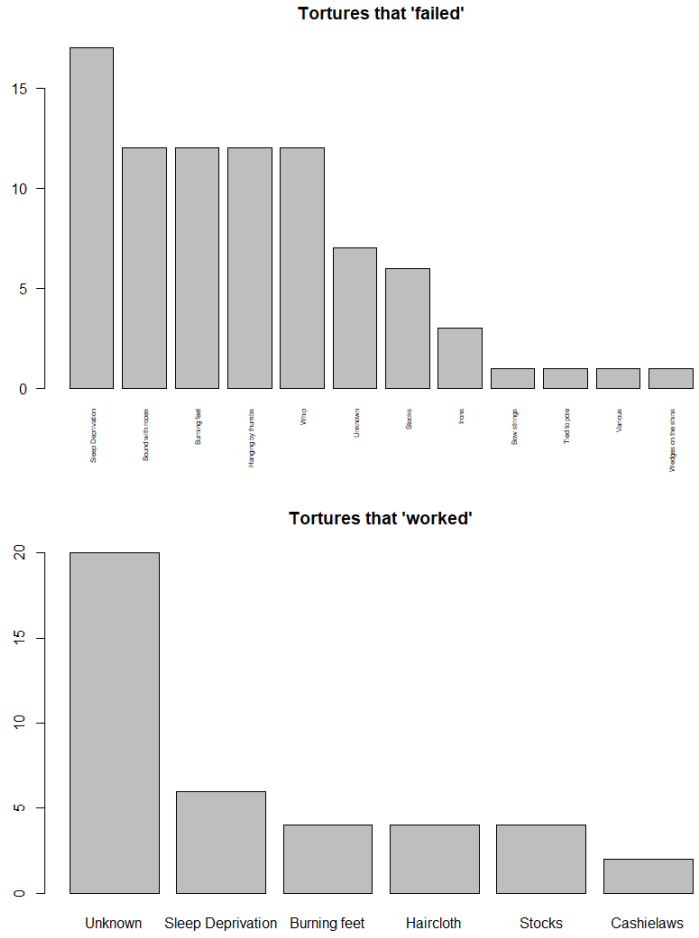


Surprisingly, most confessions weren't extracted with torture or even an ordeal. Perhaps the threat of torture or ordeal was enough to make the accused confess preemptively.

However, 84 of the 134 ordeals prompted a confession, for a 'success rate' of 62.7%, while only 40 of the 110 tortures prompted a confession for a 'success rate' of 36.4%. 16 Trials featured both a torture and an ordeal, prompting 6 confessions, for a 'success rate' of 37.5%. It seems that if a witch is stubborn enough to require torture, they're also stubborn enough that torture won't work. The better tactic for inducing a confession seems to be applying an ordeal and merely threatening torture. Of course, tortures would still be applied occasionally, because without application, the threats would be empty.

On the next page we take a closer look at which tortures seemed to 'work.'

```
TortureTypeConfess <- count(ConfessTorture,Torture_Type)                          # Count
TortureTypeConfess <- TortureTypeConfess[order(-TortureTypeConfess$n),]           # Order
TortureTypeNoConfess <- count(NoConfessTorture,Torture_Type)                      # Repeat
TortureTypeNoConfess <- TortureTypeNoConfess[order(-TortureTypeNoConfess$n),]
barplot(TortureTypeConfess$n, names.arg=TortureTypeConfess$Torture_Type,
    main = "Tortures that 'worked'")
barplot(TortureTypeNoConfess$n, names.arg=TortureTypeNoConfess$Torture_Type,las=2,cex.names = .5,
    main = "Tortures that 'failed'")
```



Horrifyingly, torture was most effective when the type of torture was unrecorded. The most popular recorded torture was sleep-deprivation, but it only induced confession about a fourth of the time.

- What happened to witches found guilty?

```
sqlSelectStatement <-
  "SELECT Sentence FROM Trial"

sqlResult <- sqlQuery(myconn, sqlSelectStatement)
levels(sqlResult$Sentence) <- c(levels(sqlResult$Sentence),"NULL")      # Add Null for not-guilty
sqlResult[is.na(sqlResult),] <- "NULL"                                  # Populate Nulls

fates <- count(sqlResult,Sentence)      # Count
fates <- fates[order(-fates$n),]        # Order
```

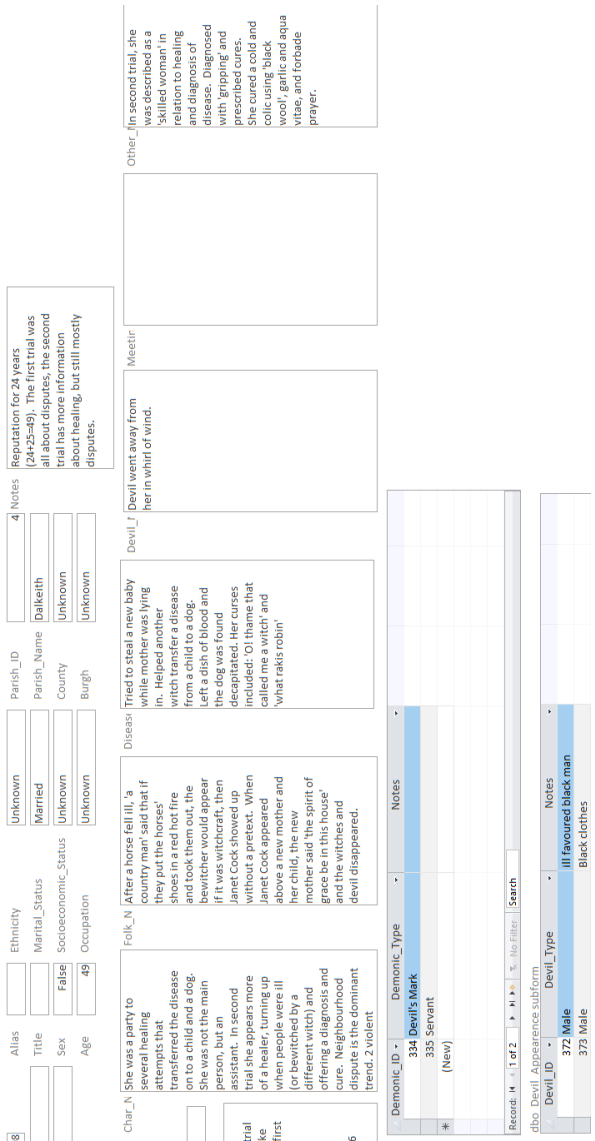
	Sentence	n
1	NULL	2904
2	Execution	205
3	Released	52
4	Banishment	27
5	Declared Fugitive	11
6	Excommunicated	6
7	Put to the horn	2
8	Branded	1
9	Hang	1
10	Prison	1
11	Public Humiliation	1

NULL and 'released' means the accused was found not guilty of witchcraft. When witches were found guilty, they were most frequently executed, banished, declared fugitive (presumably if they escaped), or excommunicated. If an accused is found guilty of witchcraft, they might hope for the $\frac{35}{207+35} = 14.5\%$ chance of banishment, excommunication, imprisonment, or humiliation over execution or branding.

(To be 'Put to the horn' sounds brutal, but apparently this meant that the accused never appeared in court and was therefore denounced as a rebel.)

Implementation in Access

While RStudio is good at turning data into charts, Access's forms and reports are more helpful for examining one accused witch's story up-close. Here's Janet Cock, who was mentioned on the first page:



Reflection

When I began, I assumed I would see the stories of people in dire straights hundreds of years ago, and to a certain extent, I did. But I often felt a step removed from the data because there was just so much of it. I didn't see 3,000 stories—I saw 80,000 interlocking pieces weaving the web of history. This is a valuable lesson about data-science in general: it's easy to miss the forest for the trees, and forget the real-world implications of the relations in our conceptual model.

Still, I think I learned a lot from the undertaking. I had taken classes in SQL in the past, but they had held my hand in giving explicit instructions every step of the way to creating a database they had already made themselves. Given the chance to create my own, I'm glad I chose such a daunting task that I couldn't help but come out the other side with a conceptual understanding not just of my database, but of databases overall.

If I did this project again, I would, first of all, choose a smaller data-set. This was a great challenge and I think it turned out well, but with a smaller database, I could try being more adventurous with relations. In this database of witch-trials, almost every table is connected to only one of three 'hubs,' Accused, Case, and Trial; I would love to try a database with fewer tables but more relational complexity.