Group Project
Team 5
Database Design and Rational

The original data is in the form of a spreadsheet.

Thus there is no referential integrity, format validation a need for Normalization and Optimization.

In designing the databasewe focussed on three main aspects:

- Linking related data
  - Through assumptions
  - Confirmation with product owner
- Removing redundancy
  - Identifying identical columns
  - Finding functional dependencies
  - Creating additional tables
- Optimization through removal of repetition
  - e.g. Storing “GSM 800” as AutoNumber “1”

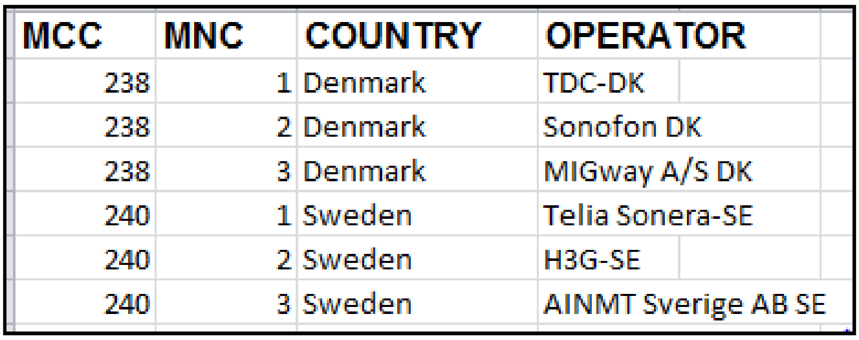
Each member of the team designed a database taking the above into account and then we came together to decide on the best aspects of each. Optimisation and Normalisation steps were treated as interchangeable.

Datatypes were chosen as INT for small numbers, DATE and VARCHAR, using VarChar for large integers to avoid rounding errors.

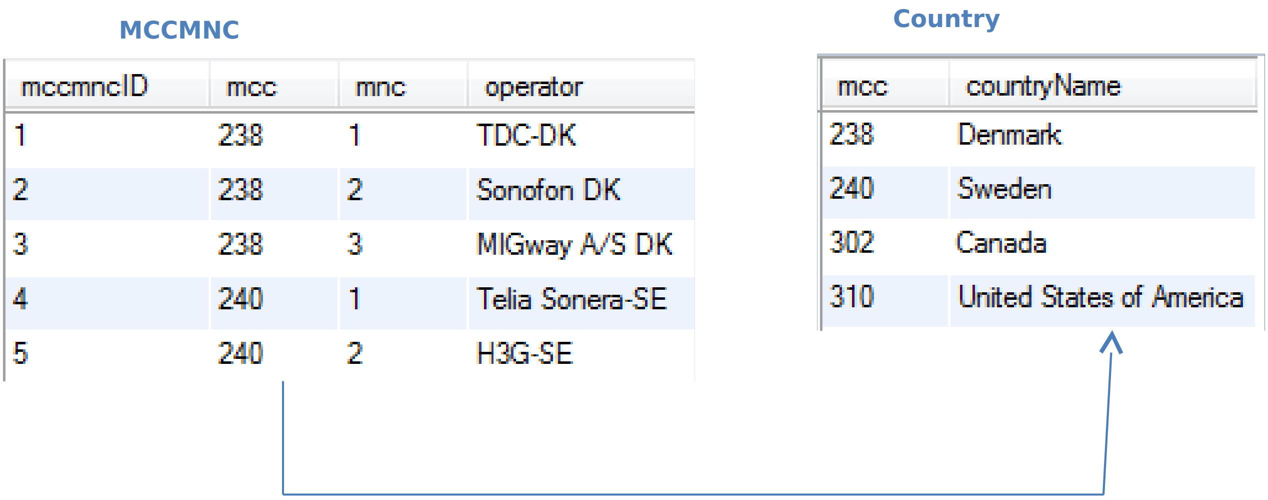
Optimization Example:

MCC-MNC Table

Optimisation: Country field extracted into a separate table, linked to the MCC



MCC	MNC	COUNTRY	OPERATOR
238	1	Denmark	TDC-DK
238	2	Denmark	Sonofon DK
238	3	Denmark	MIGway A/S DK
240	1	Sweden	Telia Sonera-SE
240	2	Sweden	H3G-SE
240	3	Sweden	AINMT Sverige AB SE



MCCMNC

mccmncID	mcc	mnc	operator
1	238	1	TDC-DK
2	238	2	Sonofon DK
3	238	3	MIGway A/S DK
4	240	1	Telia Sonera-SE
5	240	2	H3G-SE

Country

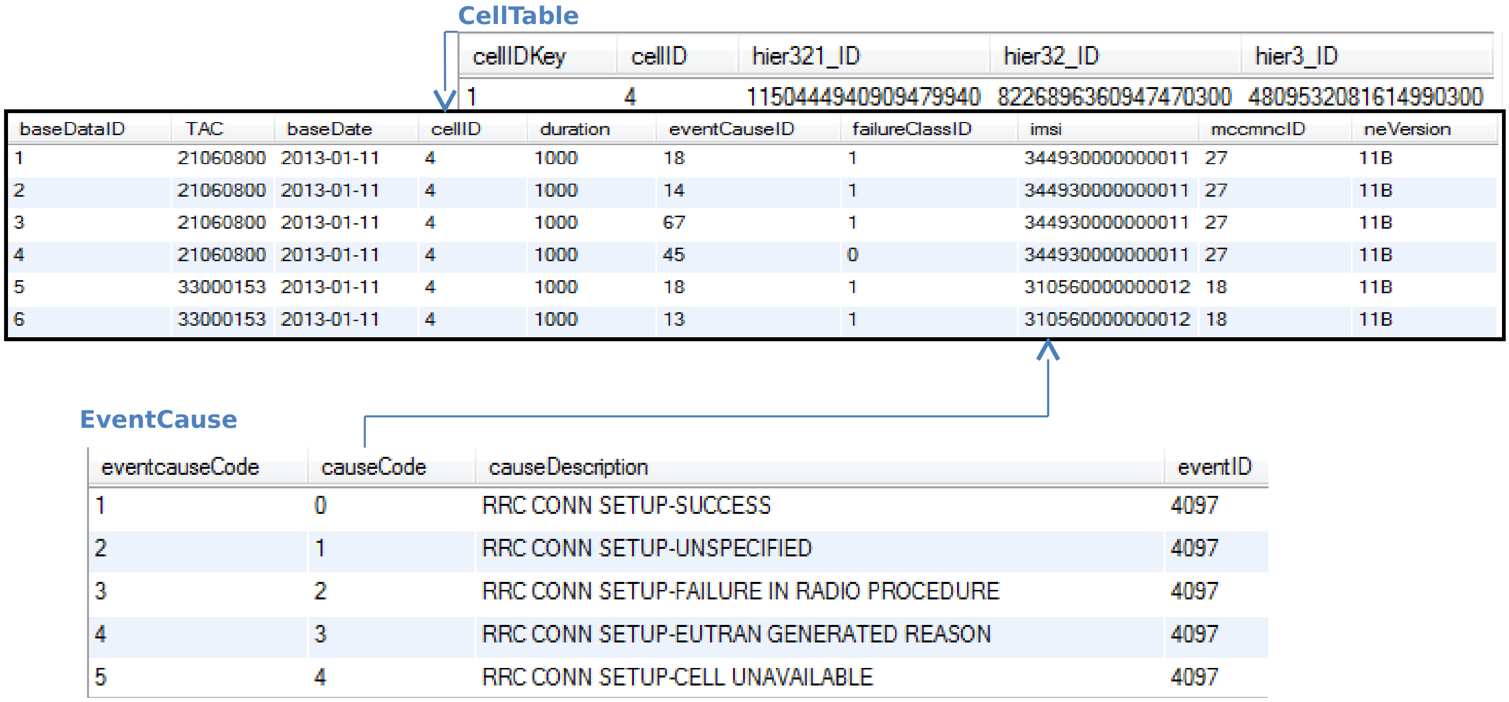
mcc	countryName
238	Denmark
240	Sweden
302	Canada
310	United States of America

Normalization Example:

BaseData Table

Functional Depndencies existed, so we added extra tables.

CellID, Hier3_ID, HIER32_ID,HIER321_ID extracted into a separate table reducing 14 initial fields down to 8 fields.



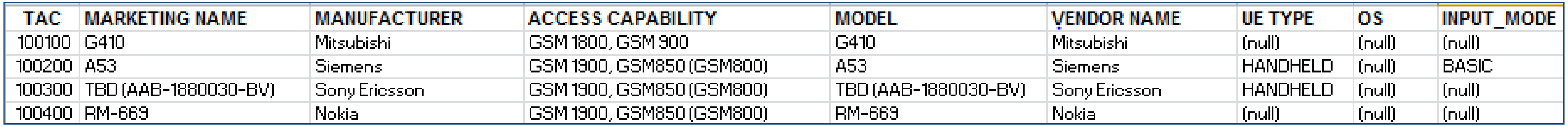
CellTable

cellIDKey	cellID	hier321_ID	hier32_ID	hier3_ID
1	4	1150444940909479940	8226896360947470300	4809532081614990300

baseDataID	TAC	baseDate	cellID	duration	eventCauseID	failureClassID	imsi	mccmncID	neVersion
1	21060800	2013-01-11	4	1000	18	1	344930000000011	27	11B
2	21060800	2013-01-11	4	1000	14	1	344930000000011	27	11B
3	21060800	2013-01-11	4	1000	67	1	344930000000011	27	11B
4	21060800	2013-01-11	4	1000	45	0	344930000000011	27	11B
5	33000153	2013-01-11	4	1000	18	1	310560000000012	18	11B
6	33000153	2013-01-11	4	1000	13	1	310560000000012	18	11B

EventCause

eventcauseCode	causeCode	causeDescription	eventID
1	0	RRC CONN SETUP-SUCCESS	4097
2	1	RRC CONN SETUP-UNSPECIFIED	4097
3	2	RRC CONN SETUP-FAILURE IN RADIO PROCEDURE	4097
4	3	RRC CONN SETUP-EUTRAN GENERATED REASON	4097
5	4	RRC CONN SETUP-CELL UNAVAILABLE	4097



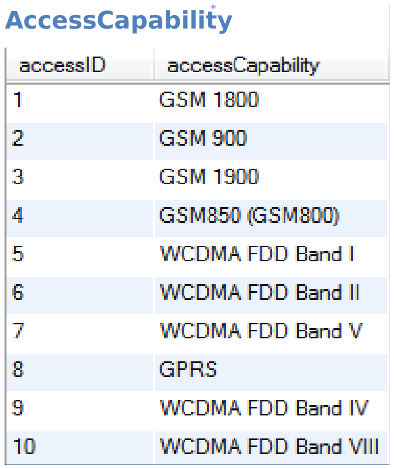
TAC	MARKETING NAME	MANUFACTURER	ACCESS CAPABILITY	MODEL	VENDOR NAME	UE TYPE	OS	INPUT_MODE
100100	G410	Mitsubishi	GSM 1800, GSM 900	G410	Mitsubishi	(null)	(null)	(null)
100200	A53	Siemens	GSM 1900, GSM850 (GSM800)	A53	Siemens	HANDHELD	(null)	BASIC
100300	TBD (AAB-1880030-BV)	Sony Ericsson	GSM 1900, GSM850 (GSM800)	TBD (AAB-1880030-BV)	Sony Ericsson	HANDHELD	(null)	(null)
100400	RM-669	Nokia	GSM 1900, GSM850 (GSM800)	RM-669	Nokia	(null)	(null)	(null)

Repeating fields:

Model = Marketing Name
Manufacturer = Vendor Name
Solution: both Model and Manufacturer columns extracted into their own table(optimisation)

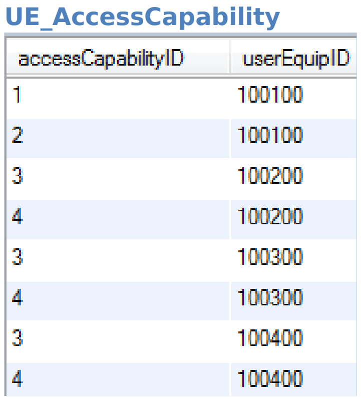
TAC - AccessCapability: 1-to-many relationship
Each access capability stored in a separate table and given an ID

An extra table connecting the TAC/UserEquipmentID) to the AccessCapabilityID



AccessCapability

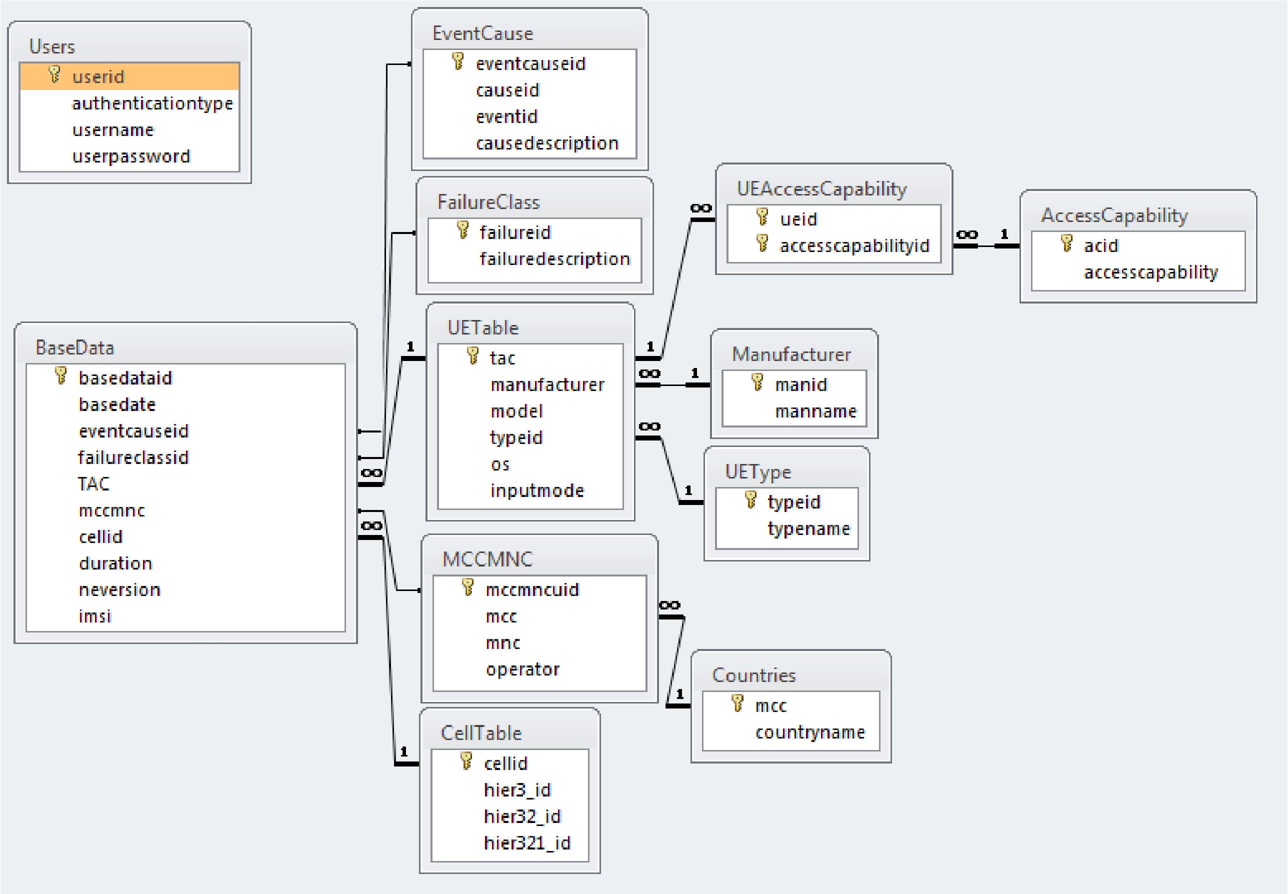
accessID	accessCapability
1	GSM 1800
2	GSM 900
3	GSM 1900
4	GSM850 (GSM800)
5	WCDMA FDD Band I
6	WCDMA FDD Band II
7	WCDMA FDD Band V
8	GPRS
9	WCDMA FDD Band IV
10	WCDMA FDD Band VIII



UE_AccessCapability

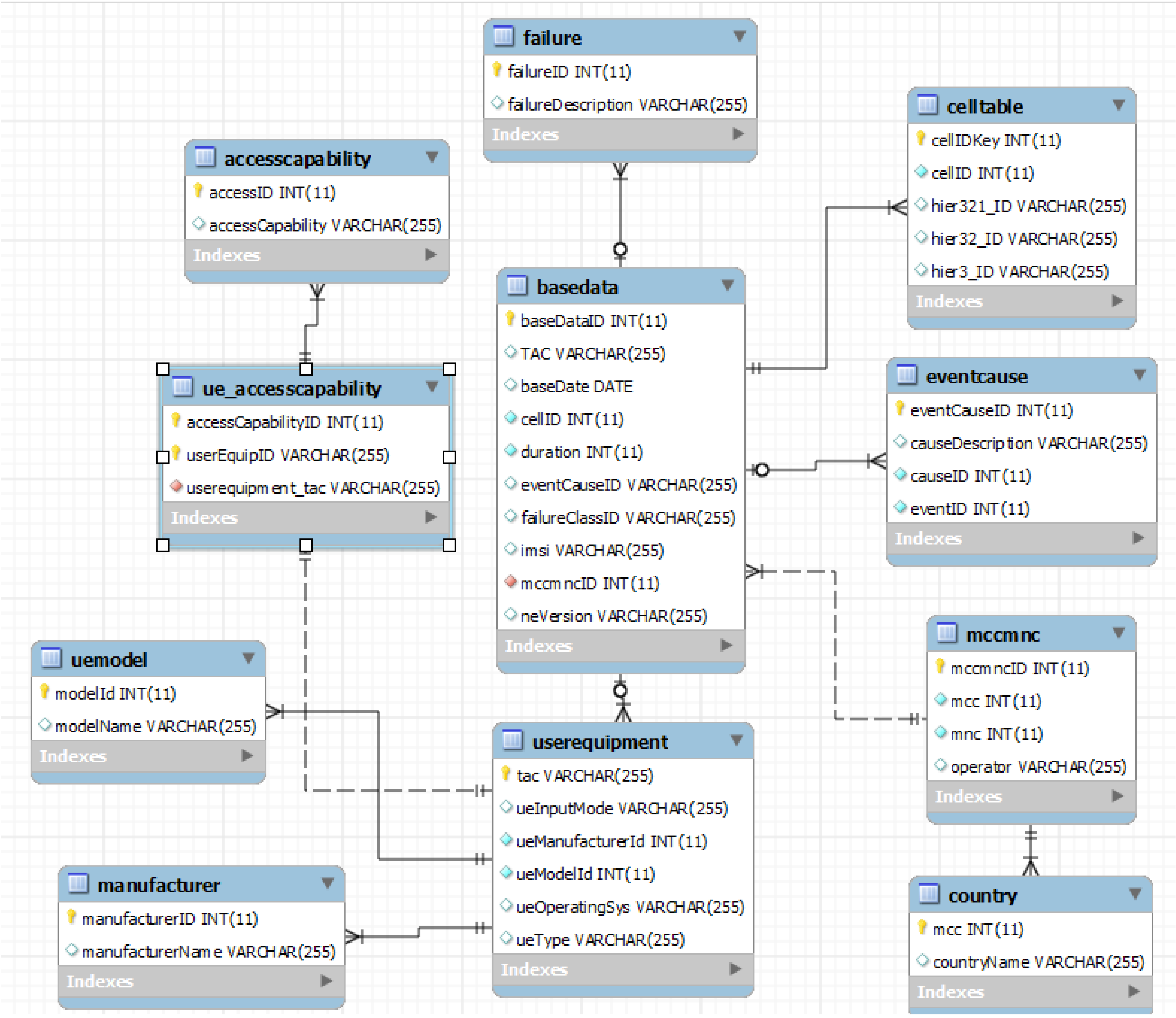
accessCapabilityID	userEquipID
1	100100
2	100100
3	100200
4	100200
3	100300
4	100300
3	100400
4	100400

The final 'initial' Entityu-Relationshhip agreed upon looked like this:



We are yet to settle on whether authorisation/security user details will be stored in this database or elsewhere.

The database as implemented in Java created mySQL looked like this


failure
failureID INT(11)
failureDescription VARCHAR(255)
Indexes
celltable
cellIDKey INT(11)
cellID INT(11)
hier321_ID VARCHAR(255)
hier32_ID VARCHAR(255)
hier3_ID VARCHAR(255)
Indexes
accesscapability
accessID INT(11)
accessCapability VARCHAR(255)
Indexes
basedata
baseDataID INT(11)
TAC VARCHAR(255)
baseDate DATE
cellID INT(11)
duration INT(11)
eventCauseID VARCHAR(255)
failureClassID VARCHAR(255)
imsi VARCHAR(255)
mccmncID INT(11)
neVersion VARCHAR(255)
Indexes
ue_accesscapability
accessCapabilityID INT(11)
userEquipID VARCHAR(255)
userequipment_tac VARCHAR(255)
Indexes
eventcause
eventCauseID INT(11)
causeDescription VARCHAR(255)
causeID INT(11)
eventID INT(11)
Indexes
mccmnc
mccmncID INT(11)
mcc INT(11)
mnc INT(11)
operator VARCHAR(255)
Indexes
uemodel
modelId INT(11)
modelName VARCHAR(255)
Indexes
userequipment
tac VARCHAR(255)
ueInputMode VARCHAR(255)
ueManufacturerId INT(11)
ueModelId INT(11)
ueOperatingSys VARCHAR(255)
ueType VARCHAR(255)
Indexes
manufacturer
manufacturerID INT(11)
manufacturerName VARCHAR(255)
Indexes
country
mcc INT(11)
countryName VARCHAR(255)
Indexes