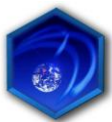


## Industrial emissions Reporting Information System Database Schema

08 December 2010



**Association ASPEN**

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# 1. Data Model Schema

The data model schema is defined by figure 1 below, a brief explanation follows detailing the purpose of each table comprising the data model.

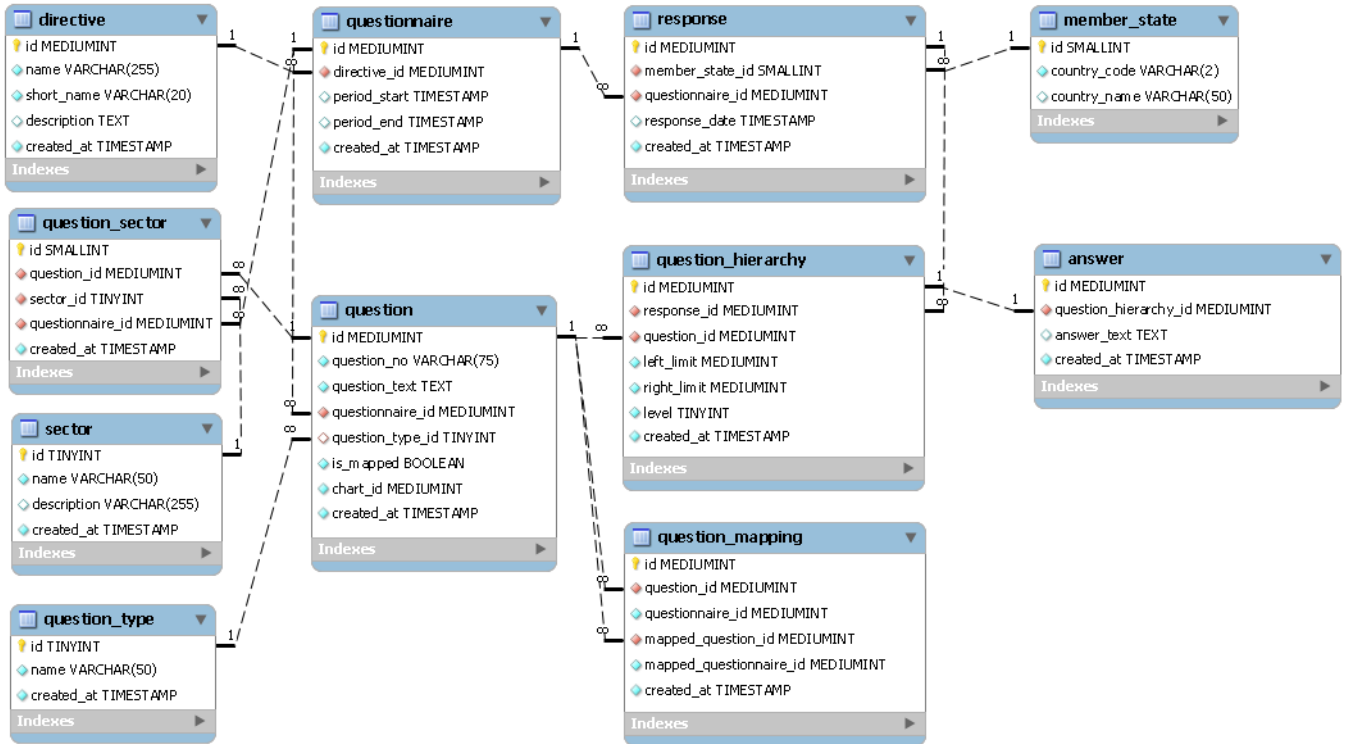


Figure 1 – Relational data model schema

The purpose and fields in each of the tables are described in detail in the Data Dictionary section of this document.

## 2. Data Model Conception

The hierarchical structure of member state questionnaire responses is stored in the database using the nested tree model<sup>1</sup>. This design pattern was used because it is highly inexpensive to query and extract data; a characteristic ideally suited to the nature of the IRIS data, that being, once collected, changes to the data are very infrequent.

The hierarchy of data contained within a nested tree model is depicted by figure 2 below. The hierarchical structure is maintained because parent questions encircle their children. This format is represented in a database through the use of left and right values, as seen in the *question\_hierarchy* table included in figure 1 above.

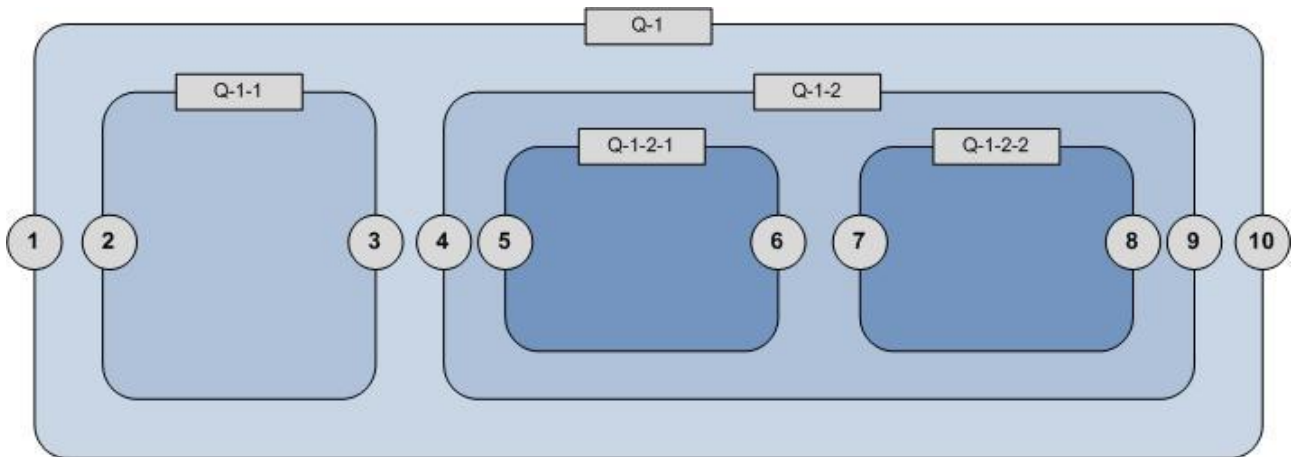


Figure 2 – Example of a nested tree model

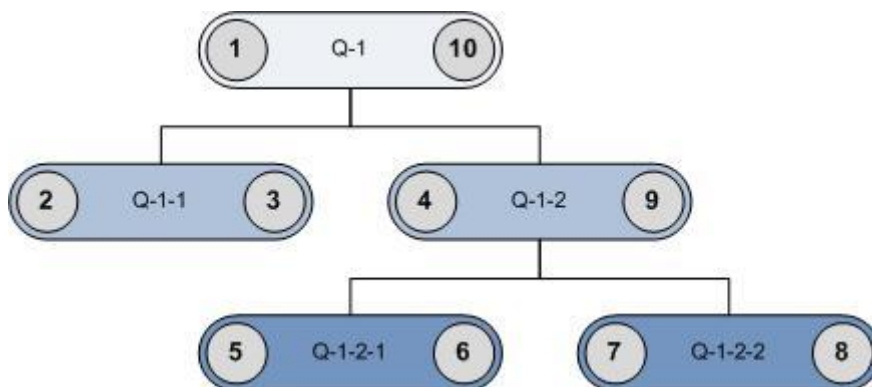


Figure 3 – Example of a nested tree model

The same hierarchy of data seen in figure 2 can be represented as a nested tree set as depicted by figure 3 above.

As mentioned previously, the hierarchical structure can assume any shape. It is therefore possible to add questions to the nested tree at any position, as required, to reflect changes made to the structure or format of a directive questionnaire. This can be achieved, because the hierarchy is stored in the database as a series of individual nodes, with the position of each node within the tree determined by the node's left and right limit values. This concept further lends itself to the prospect of combining all the directive databases into a single data structure, as the *question\_hierarchy* table would be capable of supporting the current and future formats of any and all directive questionnaires.

<sup>1</sup> <http://dev.mysql.com/tech-resources/articles/hierarchical-data.html>

## 3. Data Dictionary

### 3.1 Directive Table

The *directive* table stores the data pertaining to each of the European Commission directive. The inclusion of the *directive* table allows for the amalgamation of the four individual databases into a single unified data structure.

Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
name	VARCHAR(255)	NN	Full directive name
short_name	VARCHAR(20)	NN	Abbreviated directive name
description	TEXT	Default(NULL)	Description outlining directive purpose
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

### 3.2 Questionnaire Table

The *questionnaire* table stores the top level data necessary to represent each questionnaire used to capture the member state responses for a particular directive. Each questionnaire correlates to a single directive and has a start and end year delimiting the reporting period during which it was active for a given directive.

Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
directive_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Directive table
period_start	SMALLINT	NN, UN	Integer to record reporting period starting year (YYYY)
period_end	SMALLINT	NN, UN	Integer to record reporting period ending year (YYYY)
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

### 3.3 Response Table

The *response* table stores the top level data pertaining to each member state response. A response is made by submitting the questionnaire deemed active by the response date falling between the start and end years of the questionnaire reporting period.

Field Name	Data Type	Declarations	Purpose
id	MEDIUMINT	PK, NN, UN, AI	Primary key
member_state_id	SMALLINT	NN, UN	Foreign key to support many-to-one relationship with Member State table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Questionnaire table
response_date	TIMESTAMP	NN	Timestamp to record final date response was submitted or modified on ReportNet
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.4 Member State Table

The *member\_state* table stores the data pertaining to each European member state.

Field Name	Data Type	Declarations	Purpose
<b>id</b>	SMALLINT	PK, NN, UN, AI	Primary key
<b>country_code</b>	VARCHAR(3)	NN	Follows ISO 3166-1 alpha 2 code
<b>country_name</b>	VARCHAR(50)	Default(NULL)	Country name used to filter responses by member state

## 3.5 Question Table

The *question* table stores the data pertaining to each question that appears on a questionnaire.

Field Name	Data Type	Declarations	Purpose
<b>id</b>	MEDIUMINT	PK, NN, UN, AI	Primary key
<b>question_no</b>	VARCHAR(50)	NN	Question number
<b>question_text</b>	TEXT	NN	Question text
<b>questionnaire_id</b>	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Questionnaire table
<b>question_type_id</b>	TINYINT	NN, UN	Foreign key to support many-to-one relationship with Question Type table
<b>is_mapped</b>	BOOLEAN	NN, Default(FALSE)	Boolean to indicate the presence of a question mapping relationship
<b>chart_id</b>	MEDIUMINT	UN, NN, Default(0)	Foreign key to support many-to-one relationship with Chart table
<b>created_at</b>	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.6 Question Type Table

The *question type* table stores the data pertaining to the different types of response that can be given to a question. For example, qualitative descriptive, qualitative standardised, qualitative, etc.

Field Name	Data Type	Declarations	Purpose
<b>id</b>	TINYINT	PK, NN, UN, AI	Primary key
<b>name</b>	VARCHAR(50)	NN	Question type
<b>created_at</b>	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.7 Question Sector Table

The *question\_sector* table stores the relationships between questions and their sector categorisations

Field Name	Data Type	Declarations	Purpose
id	SMALLINT	PK, NN, UN, AI	Primary key
question_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Question table
sector_id	TINYINT	NN, UN	Foreign key to support many-to-one relationship with Sector table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Questionnaire table
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.8 Sector Table

The *sector* table stores the data pertaining to sector categorisations outlined in the annex of each directive questionnaire.

Field Name	Data Type	Declarations	Purpose
id	TINYINT	PK, NN, UN, AI	Primary key
name	VARCHAR(50)	NN	Sector name used to filter questions and responses by sector
description	VARCHAR(255)	NN	Extended description of sector taken from Directive annex
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.9 Question Mapping Table

The *question\_mapping* table stores the mappings between comparable questions included on the questionnaires for different directive reporting periods

Field Name	Data Type	Declarations	Purpose
id	TINYINT	PK, NN, UN, AI	Primary key
question_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Question table
questionnaire_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Questionnaire table
mapped_question_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Question table
mapped_questionnaire_id	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Questionnaire table
created_at	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.10 Question Hierarchy Table

The *question\_hierarchy* table stores multiple nested tree models, with each table entry containing the data necessary to represent a single node within a larger tree. The *response\_id* field uniquely identifies nodes belonging to different nested trees, thus allowing many trees to be stored concurrently within the same data structure. This table shares a many-to-one relationship with the *question* table, thus supporting the provision for a question to appear in multiple nested trees.

Field Name	Data Type	Declarations	Purpose
<b>id</b>	MEDIUMINT	PK, NN, UN, AI	Primary key
<b>response_id</b>	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Response table
<b>question_id</b>	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Question table
<b>left_limit</b>	MEDIUMINT	NN, UN	Integer to record left limit of current node in nested tree structure
<b>right_limit</b>	MEDIUMINT	NN, UN	Integer to record right limit of current node in nested tree structure
<b>level</b>	TINYINT	NN, UN	Integer to record depth of current node in nested tree structure
<b>created_at</b>	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted

## 3.11 Answer Table

The *answer* table stores the data pertaining to each answer provided in response to a single question on a questionnaire response

Field Name	Data Type	Declarations	Purpose
<b>id</b>	MEDIUMINT	PK, NN, UN, AI	Primary key
<b>question_hierarchy_id</b>	MEDIUMINT	NN, UN	Foreign key to support many-to-one relationship with Answer table
<b>answer_text</b>	TEXT	NN	Member state response to question identified by question hierarchy node
<b>created_at</b>	TIMESTAMP	NN, Default(CURRENT_TIMESTAMP)	Timestamp to record when data record was inserted





The Gemini Building  
Fermi Avenue  
Harwell  
Didcot  
OX11 0QR  
Tel: 0845 345 3302  
Fax: 0870 190 6138

E-mail: [enquiry@aeat.co.uk](mailto:enquiry@aeat.co.uk)  
[www.aeat.com](http://www.aeat.com)