# **Power BI Model Router – Data Model Design**

This document defines the relational database schema used to support a Power BI load balancer system. The system enables zero-downtime refreshes by alternating active roles between two semantic models — a Reader (serving queries) and a Writer (undergoing refresh).

## **Tables**

## **1. refresh\_worker\_model**

### **Purpose**

Stores metadata about each Power BI semantic model instance (worker node).

### **Columns**

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Type** | **Description** |
| worker\_model\_id | INT (PK) | Unique identifier for each model. Used as FK in related tables |
| model\_name | TEXT | Logical name (e.g., arc\_risk\_model\_node1) |
| workspace\_id | INT | Power BI workspace ID |
| dataset\_id | INT | Power BI dataset ID |
| is\_enabled | BOOLEAN | Indicates if model is active and allowed to participate |
| created\_at | TIMESTAMPTZ | Registration timestamp |
| updated\_at | TIMESTAMPTZ | Last update timestamp |

## **2. refresh\_model\_state**

### **Purpose**

Singleton table used by the switching service to determine current Reader and Writer models.

### **Columns**

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Type** | **Description** |
| model\_state\_id | INT (PK) | Primary key. Only one row should exist |
| reader\_model\_id | INT (FK) | References currently active Reader model |
| writer\_model\_id | INT (FK) | References currently active Writer model |
| status | TEXT | System state (idle, switching, etc.) |
| last\_switch\_time | TIMESTAMPTZ | Timestamp of last Reader/Writer switch |
| updated\_at | TIMESTAMPTZ | Last update timestamp |

## **3. refresh\_model\_role\_history**

### **Purpose**

Tracks role changes over time for auditability and diagnostics.

### **Columns**

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Type** | **Description** |
| model\_role\_history\_id | INT (PK) | Unique ID for each role assignment |
| worker\_model\_id | INT (FK) | References the model assigned the role |
| role | TEXT | Either reader or writer |
| is\_current | BOOLEAN | True if the assignment is current |
| activated\_at | TIMESTAMPTZ | When this role was activated |
| deactivated\_at | TIMESTAMPTZ | When this role ended (null if still active) |
| switch\_reason | TEXT | Reason for role switch (scheduled refresh, etc.) |

## **4. model\_refresh\_log**

### **Purpose**

Tracks refresh execution and status for each semantic model, used for diagnostics and alerting.

### **Columns**

|  |  |  |
| --- | --- | --- |
| **Column Name** | **Type** | **Description** |
| model\_refresh\_log\_id | INT(PK) | Unique ID for each refresh log entry |
| worker\_model\_id | INT (FK) | References the model being refreshed |
| refresh\_started\_at | TIMESTAMPTZ | Refresh start time |
| refresh\_ended\_at | TIMESTAMPTZ | Refresh end time (null if still in progress) |
| status | TEXT | success, failure, or in\_progress |
| message | TEXT | Optional details or error message |

## **Workflow Overview**

1. On service startup, model\_state tells the system which model is reader and which is writer.
2. The service refreshes the writer, logs the result in model\_refresh\_log.
3. If successful, the service:
   1. Updates model\_state to switch roles.
   2. Logs the new role assignment in model\_role\_history.