MayaCal

Function of Tzolk'in Calendar structures in the Postclassic Maya Codices

Stage Report 1

Jakub Špoták

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RECOVERY AND RESILIENCE PLAN

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Technical Report: Design of the Maya Codices Database

I. INTRODUCTION

This report describes the conceptual and technical design of a FileMaker Pro database created for the documentation and analysis of Mesoamerican codices. The goal of the system is to support epigraphic, iconographic and calendrical research by enabling structured data entry and advanced record linking between codex pages, registers, almanacs and other layered components.

II. TECHNOLOGY & PLATFORM

The system was developed in FileMaker Pro, a flexible and visually oriented relational database platform. FileMaker's native support for container fields, script-based automation, and rapid layout prototyping make it ideal for projects involving image-based documentation and complex hierarchies of records. The choice of FileMaker enables both local and server-hosted access, including WebDirect.

III. DATABASE STRUCTURE

The database is organized around a modular model reflecting the structure of codices. (Figure 1 Overview of tables used in the database. At the top level, the `COD_Codices` table stores metadata for each codex. Each codex has multiple pages (`CPG_Codices_Pages`), which in turn are subdivided into registers (`CPG_Codices_Registers`). Registers may contain multiple almanacs (`CDA_Codices_Almanac`) which often span multiple pages. Additionally, epigraphic data (`CDE_Codices_Epigraphy`) and images (`CDI_Codices_Images`) are linked contextually.

⇕	COD_Codices	FileMaker	34 fields, 5 records	T13_CODICES, T13b_pages_CODICES, T13c_registers_CODICES, T13d_almanac_CODICES, T13e_row_CODICES
⇕	CPG_Codices_Pages	FileMaker	13 fields, 208 records	T13_CODICES_PAGES, T13a_codices_PAGES, T13c_registers_PAGES, T13d_almanac_PAGES, T13e_row_PAGES
⇕	CPG_Codices_Registers	FileMaker	11 fields, 43 records	T13_CODICES_REGISTERS, T13a_codices_REGISTERS, T13b_pages_REGISTERS, T13d_almanac_REGISTERS, T13e_
⇕	CDA_Tzolkin_reference	FileMaker	2 fields, 260 records	CDA_Tzolkin_reference
⇕	CDA_Codices_Almanac	FileMaker	31 fields, 6 records	T13_CODICES_ALMANACS, T13a_codices_ALMANACS, T13c_registers_ALMANACS, T13e_row_ALMANAC
⇕	CDA_Codices_Almanac_Calendar_row	FileMaker	55 fields, 20 records	T13_CODICES_ALMANAC_ROW, T13a_codices_ROWS, T13c_registers_ROWS, T13d_almanac_ROWS
⇕	CDA_Almanac_Start_Days	FileMaker	5 fields, 1 record	
⇕	CDA_Almanac_Distance_Steps	FileMaker	4 fields, 1 140 records	
⇕	CDA_Almanac_Results	FileMaker	5 fields, 0 records	
⇕	CDE_Codices_Epigraphy	FileMaker	8 fields, 0 records	
⇕	CDI_Codices_Iconography	FileMaker	9 fields, 0 records	
⇕	CDC_Codices_Calendar	FileMaker	9 fields, 0 records	

Figure 1 Overview of tables used in the database.

III.a TABLE EXAMPLES

Below are examples of selected tables as implemented in FileMaker Pro, showing relevant fields for pages, registers, and almanacs. These fields include foreign keys, timestamps, and data-specific structures such as Tzolk'in sequence tracking or image metadata. There are different types of fields. Text contains any type of information – plain text or numbers, which are not meant to be as calculations. Numbers are meant to be as source of calculation and can contain only numbers. Container is type of field, which can contain images, files, pdfs. Last type of field is Calculation, which means, that result of this field depends of other sources and it can by variable. (Figures 2-4)

Table: CPG_Codices_Pages 13 fields

Field Name	Type
ID_Codices_Pages	Text
CreationTimestamp	Timestamp
CreatedBy	Text
ModificationTimestamp	Timestamp
ModifiedBy	Text
id_codices	Text
PageNumber	Text
Side	Text
PageImage	Container
Dimensions_W	Text
Dimensions_H	Text
ConservationState	Text
Notes	Text

Figure 2 Example of fields in table Pages.

Table: CPG_Codices_Registers 11 fields

Field Name	Type	Options / Comments (Click to toggle)
ID_Codices_Registers	Text	Indexed, Auto-enter Serial, Can't Modify Auto, Required Value, Unique
CreationTimestamp	Timestamp	Creation Timestamp (Date and Time), Can't Modify Auto, Required Value, 4-Digit Year Date
CreatedBy	Text	Creation Account Name, Can't Modify Auto, Required Value
ModificationTimestamp	Timestamp	Modification Timestamp (Date and Time), Can't Modify Auto, Required Value, 4-Digit Year Date
ModifiedBy	Text	Modification Account Name, Can't Modify Auto, Required Value
id_codices	Text	Indexed
id_codices_pages	Text	Indexed
Frames	Text	
Register	Text	
Register_image	Container	
Codex_short	Calculation	Unstored, from T13b_pages_REGISTERS, = Case (T13b_pages_CODICES::Name ; "Dresden Codex" ;"D.")

Figure 3 Example of fields in table Registers. Notice calculation field "Codex_short" which is designed to use shorten version of codex name in some parts of database, like titles, headers.

Table: CDA_Codices_Almana... 55 fields

Field Name	Type	Options / Comments (Click to toggle)
ID_Codices_Almanac_row	Text	Indexed, Auto-enter Serial, Auto-enter Calculation replaces existing value, Can't Modify Auto, Required Value, Unique
CreationTimestamp	Timestamp	Creation Timestamp (Date and Time), Can't Modify Auto, Required Value, 4-Digit Year Date
CreatedBy	Text	Creation Account Name, Can't Modify Auto, Required Value
ModificationTimestamp	Timestamp	Modification Timestamp (Date and Time), Can't Modify Auto, Required Value, 4-Digit Year Date
ModifiedBy	Text	Modification Account Name, Can't Modify Auto, Required Value
id_codices	Text	Indexed
id_codices_pages	Text	Indexed
id_codices_registers	Text	Indexed
Type	Text	
NoFrames	Text	
Start_Koef	Number	
Num_Start_Days	Number	
Num_Steps	Number	
Results	Number	
Tzolkin_1	Number	
Tzolkin_2	Number	
Tzolkin_3	Number	
Tzolkin_4	Number	
Tzolkin_5	Number	
Tzolkin_6	Number	
Tzolkin_7	Number	
Tzolkin_8	Number	
Tzolkin_9	Number	
Tzolkin_10	Number	
DN_1	Text	
DN_2	Text	
DN_3	Text	
DN_4	Text	
DN_5	Text	
DN_6	Text	
DN_7	Text	
DN_8	Text	
DN_9	Text	
DN_10	Text	

Figure 4 Example of fields in table Almanacs.

III.b RELATIONSHIPS

The database uses a hybrid anchor-buoy relationship model. Each primary table (Codices, Pages, Registers) acts as an anchor, while related tables are connected as buoy instances, allowing modular layout development and script-friendly context referencing. The following diagrams illustrate relationship structures for the main entities:

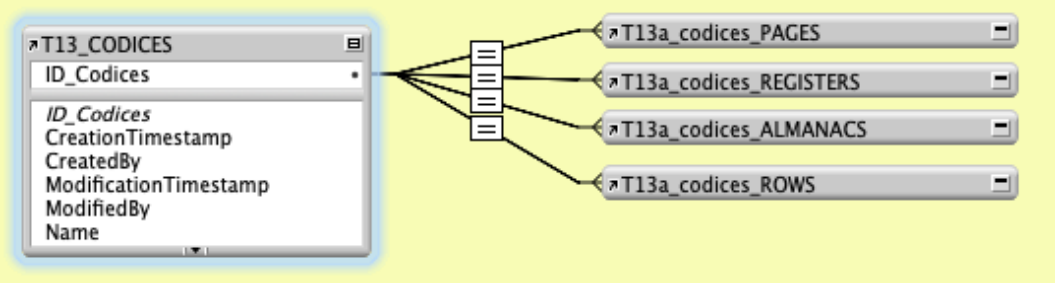

Figure 5 Anchor-buoy model: Codices and rest of tables.

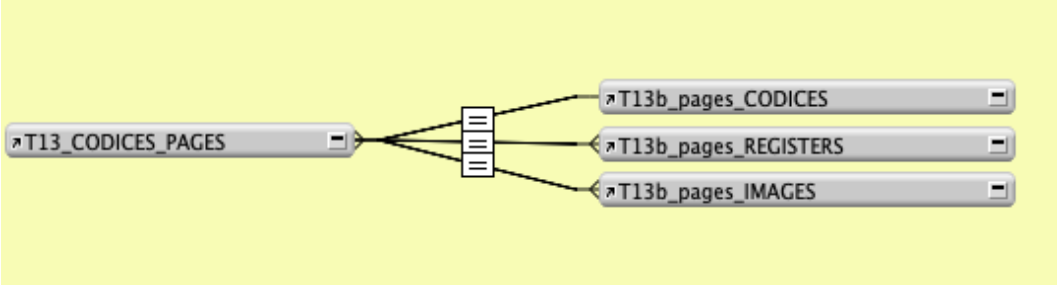

Figure 6 Relationship between Pages and other tables. Notice different types of relationships - 1. Pages - Codices are in relationship many to one. 2. Other relationships are in form one-to-many.

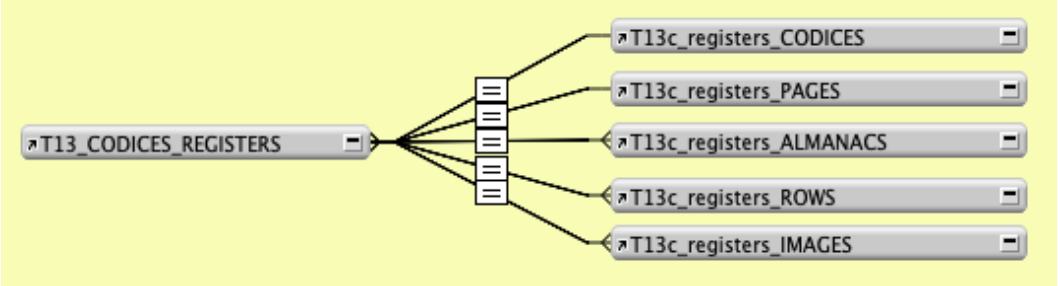

Figure 7 Anchor-buoy relationship between Registers and rest of database. Combination of 1:N and N:1 relationships.

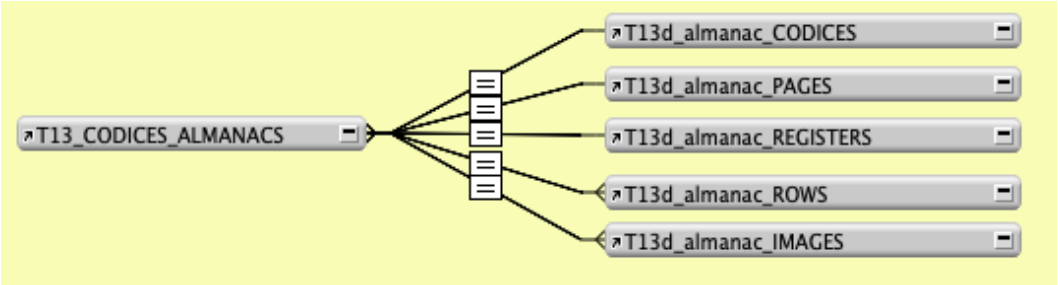

Figure 8 Relationship graph: Almanacs table.

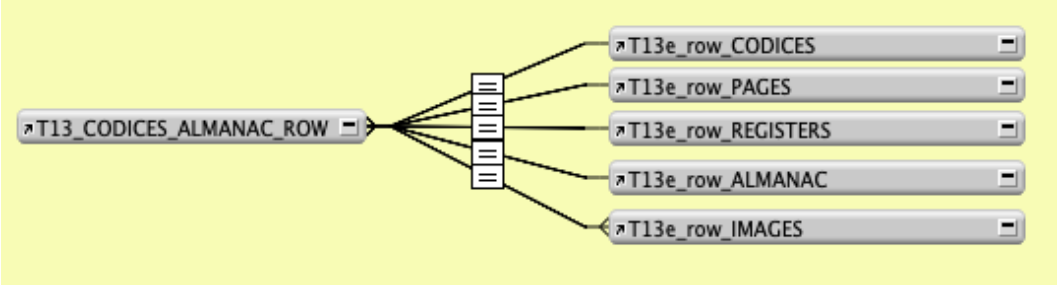

Figure 9 Relationship between Almanac rows and rest of database. Besides images, it is always N:1 relationship.

IV. DESIGN DECISIONS

The decision to extract images into a separate `Images` table was crucial for flexibility: one image can belong to a page, a register, or an almanac, each with different types (scan, reconstruction, drawing), authorship, and source metadata. Auto-enter calculations propagate foreign keys to deeper levels (e.g. Codices → Pages → Registers → Almanacs), ensuring referential integrity during data entry, especially when using nested portals. (Figure 10)

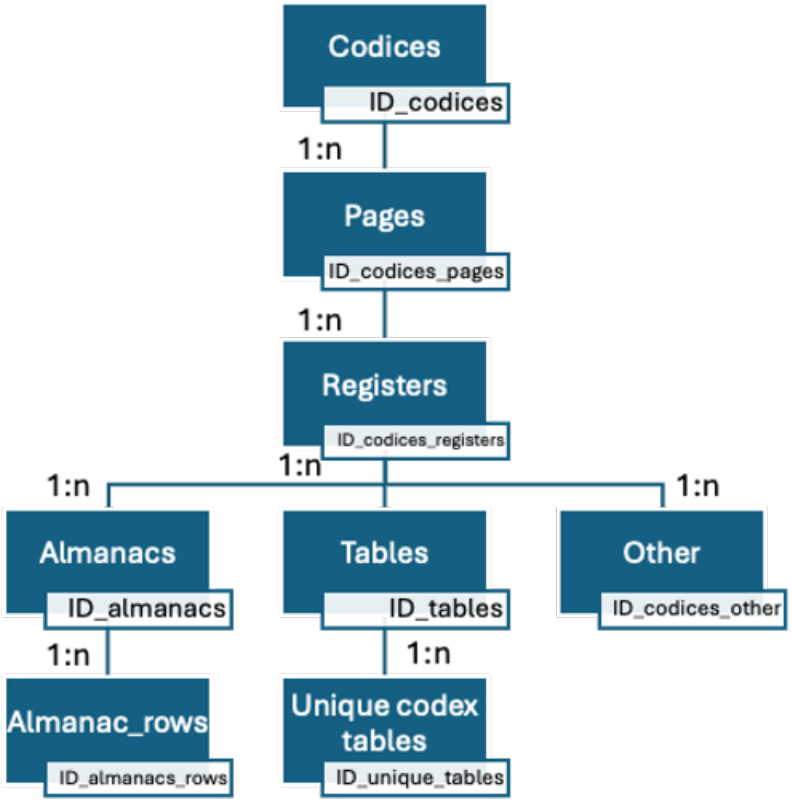

Figure 10 Logical hierarchy of codex-related tables.

V. DATABASE USAGE CONTEXT

The structure is tailored to the needs of codex research: documentation of variations of the same page (scans, drawings, reconstructions), tracking calendar sequences, recording epigraphic and iconographic elements, and associating images with structured metadata. The database is scalable for multiple codices and supports derived analyses (e.g. calendrical calculators, page-reconstruction workflows).

VI. FUTURE DEVELOPMENT

Planned expansions include OCR/text transcription modules, export to TEI/XML standards, connection to GIS or cartographic layers, and deployment via FileMaker Server. Advanced automation for Tzolk'in pattern recognition and epigraphic segmentation are also under development.