Starting shortly

Please wait!

Bridging the gap

between **databases** and **mobile data collection** in Monitoring & Evaluation

February 3rd, 2022

ActivityInfo

Outline

1. The Relational Model
2. Importance for M&E
3. Mobile Data collection models
4. Bridging the gap with ActivityInfo

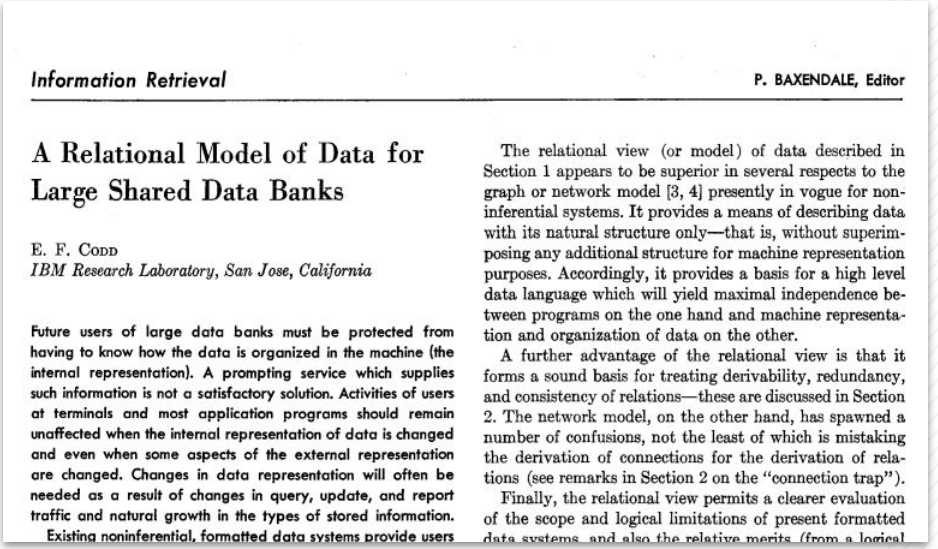
Activity Info

What is a relational database?

Relational Model

Introduced in 1971, by E.F. Codd

A collection of tables consisting of rows and columns, with relationships between those tables.



Information Retrieval P. BAXENDALE, Editor

A Relational Model of Data for Large Shared Data Banks

E. F. CODD
IBM Research Laboratory, San Jose, California

Future users of large data banks must be protected from having to know how the data is organized in the machine (the internal representation). A prompting service which supplies such information is not a satisfactory solution. Activities of users at terminals and most application programs should remain unaffected when the internal representation of data is changed and even when some aspects of the external representation are changed. Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information.

Existing noninferential, formatted data systems provide users

The relational view (or model) of data described in Section 1 appears to be superior in several respects to the graph or network model [3, 4] presently in vogue for noninferential systems. It provides a means of describing data with its natural structure only—that is, without superimposing any additional structure for machine representation purposes. Accordingly, it provides a basis for a high level data language which will yield maximal independence between programs on the one hand and machine representation and organization of data on the other.

A further advantage of the relational view is that it forms a sound basis for treating derivability, redundancy, and consistency of relations—these are discussed in Section 2. The network model, on the other hand, has spawned a number of confusions, not the least of which is mistaking the derivation of connections for the derivation of relations (see remarks in Section 2 on the "connection trap").

Finally, the relational view permits a clearer evaluation of the scope and logical limitations of present formatted data systems, and also the relative merits (from a logical

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https://www.seas.upenn.edu/~zives/03f/cis550/codd.pdf

Key concepts

- Table
- Column
- Row
- Primary Key
- Foreign Key
- Normal Form

Tables and Columns

Training Attendance

ID	Training	Date	Beneficiary ID
1	Seeds	2022-01-16	1
2	Seeds	2022-01-16	2
3	Int'l Standards	2022-02-15	2
4	Int'l Standards	2022-02-15	3

Beneficiary

ID	Name	Province ID
1	Alex	1
2	Fay	1
3	Jeric	2

Province

ID	Name
1	Nord Kivu
2	Sud Kivu

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Columns

In the relational model, columns have a **type:**

- Text
- Integer (1, 2, 3…)
- Decimal (3.14, 5.5)
- Boolean (Yes/No)
- Date
- Binary (images, PDFs ,etc)

Primary Keys

Training Attendance

ID	Training	Date	Beneficiary ID
1	Seeds	2022-01-16	1
2	Seeds	2022-01-16	2
3	Int'l Standards	2022-02-15	2
4	Int'l Standards	2022-02-15	3

Beneficiary

ID	Name	Province ID
1	Alex	1
2	Fay	1
3	Jeric	2

Province

ID	Name
1	Nord Kivu
2	Sud Kivu

Foreign Keys

Training Attendance

ID	Training	Date	Beneficiary ID
1	Seeds	2022-01-16	1
2	Seeds	2022-01-16	2
3	Int'l Standards	2022-02-15	2
4	Int'l Standards	2022-02-15	3

Beneficiary

ID	Name	Province ID
1	Alex	1
2	Fay	1
3	Jeric	2

Province

ID	Name
1	Nord Kivu
2	Sud Kivu

Types of Primary Key

Natural Key:

A unique ID that exists outside of the database.

Examples: First+Last+DOB, National ID

Surrogate Key:

“Internal” database ID

Examples: serial number

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De-Normal Form

Training Attendance

ID	Training	Date	Name	Ben. ID
1	Seeds	2022-01-16	Alexander	1
2	Seeds	2022-01-16	Fay	2
3	Standards	2022-02-15	Alex	1
4	Standards	2022-02-15	Jeric	3

Beneficiary

ID	Name	Gender
1	Alex	Male
2	Fay	Female
3	Jeric	Male

Normalizing…

Training Attendance

ID	Training	Date	Ben. ID
1	Seeds	2022-01-16	1
2	Seeds	2022-01-16	2
3	Standards	2022-02-15	1
4	Standards	2022-02-15	3

Beneficiary

ID	Name	Gender
1	Alex	Male
2	Fay	Female
3	Jeric	Male

Normal Form

Training Session

ID	Name	Date
1	Seeds	2022-01-16
2	Standards	2022-02-15

Training Attendance

Training ID	Ben. ID
1	1
1	2
2	1
2	3

Beneficiary

ID	Name	Gender
1	Alex	Male
2	Fay	Female
3	Jeric	Male

Comparing Excel

- Data quality rules enforced by the database
- Designed to accommodate a larger volume of data than Excel

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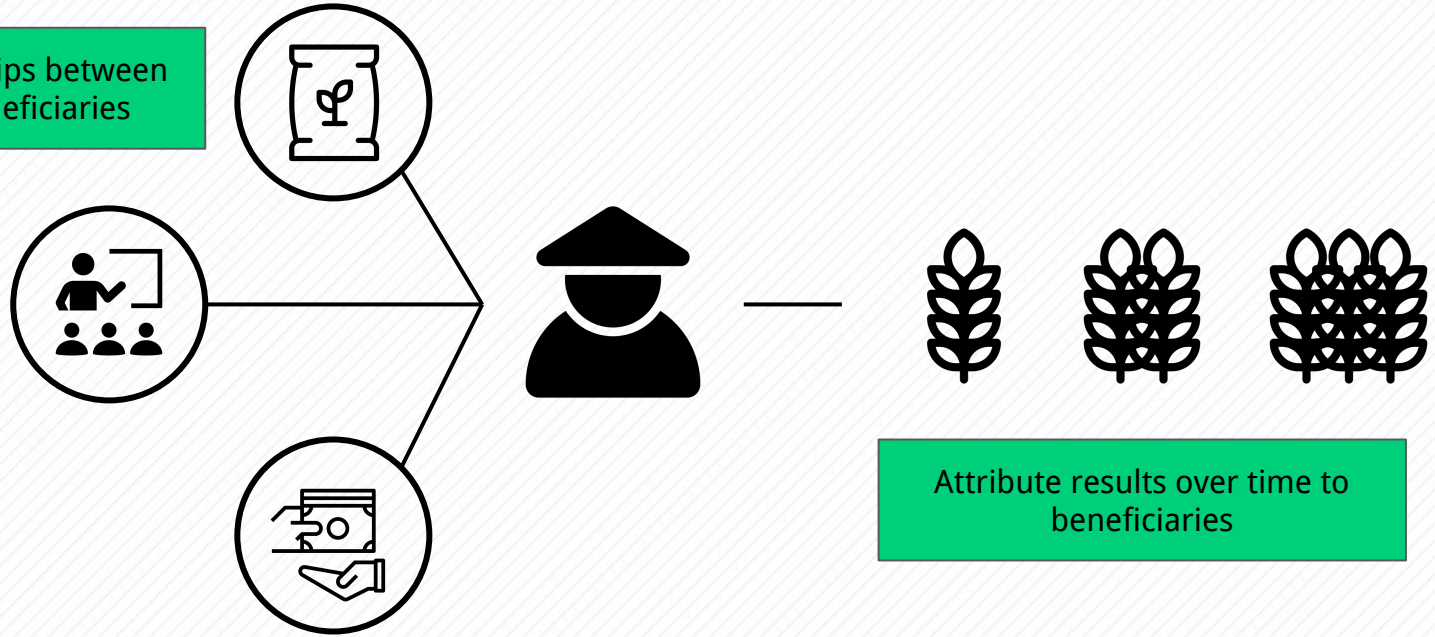
Importance of the relational model for Monitoring & Evaluation

A relational database helps you build a complete picture of your beneficiaries

Establish relationships between activities and beneficiaries



Attribute results over time to beneficiaries

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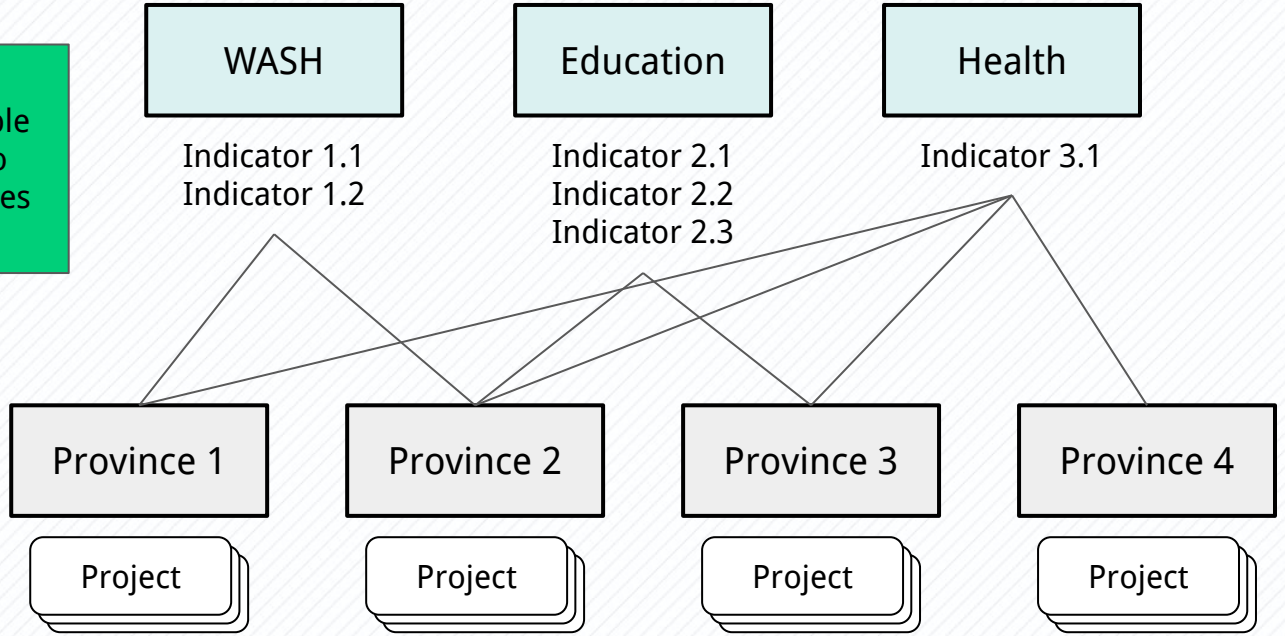
A relational database helps you organize the results your team has achieved

Aggregate multiple data points into relevant categories



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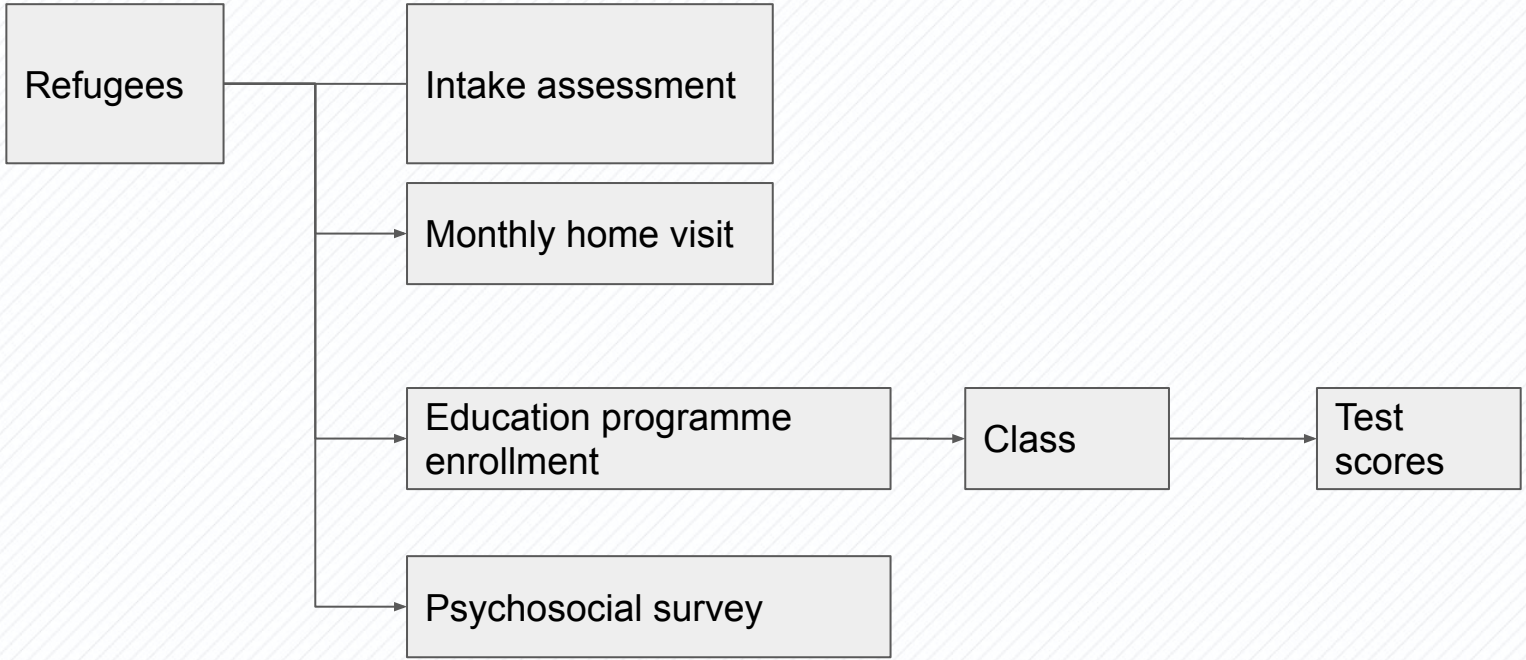
Flexible model - Refugee Programme



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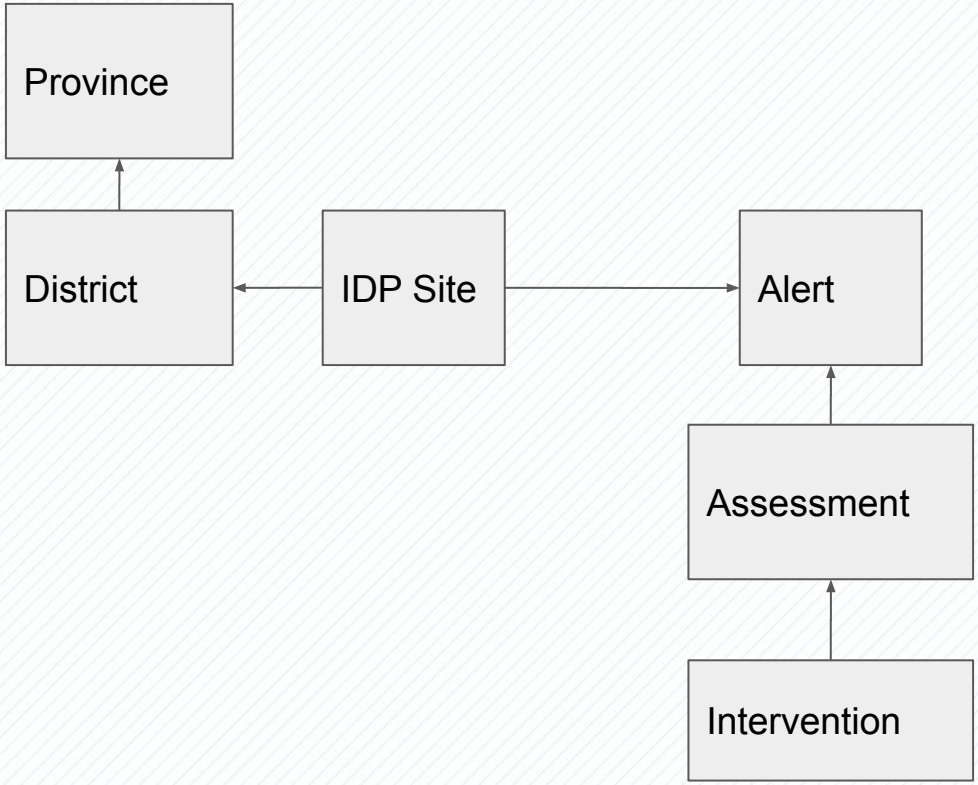
Flexible model - Rapid response mechanism



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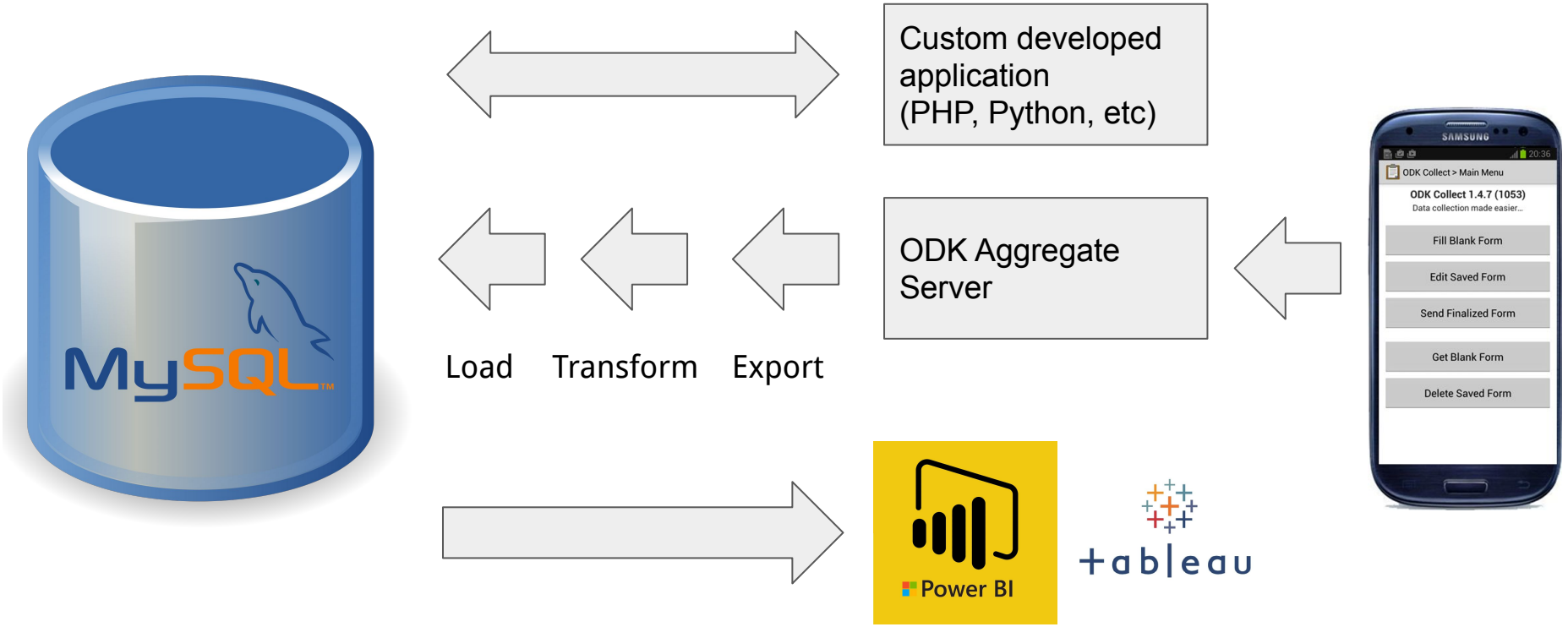
(Mobile) Data Collection

Examples of Relational Databases

Getting data into a database



Mobile Data Collection: XForm

Many mobile collection apps (ODK, Kobo, etc) are based on the XForms standard.

XForms is an XML format for collecting inputs from web forms.

XForms is a **document model**, not a **relational model.**

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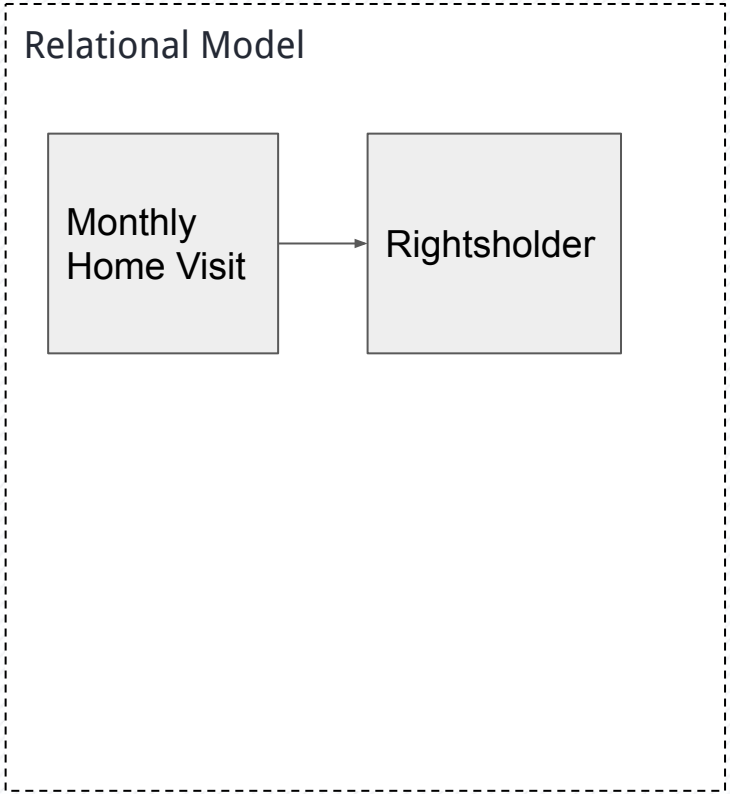
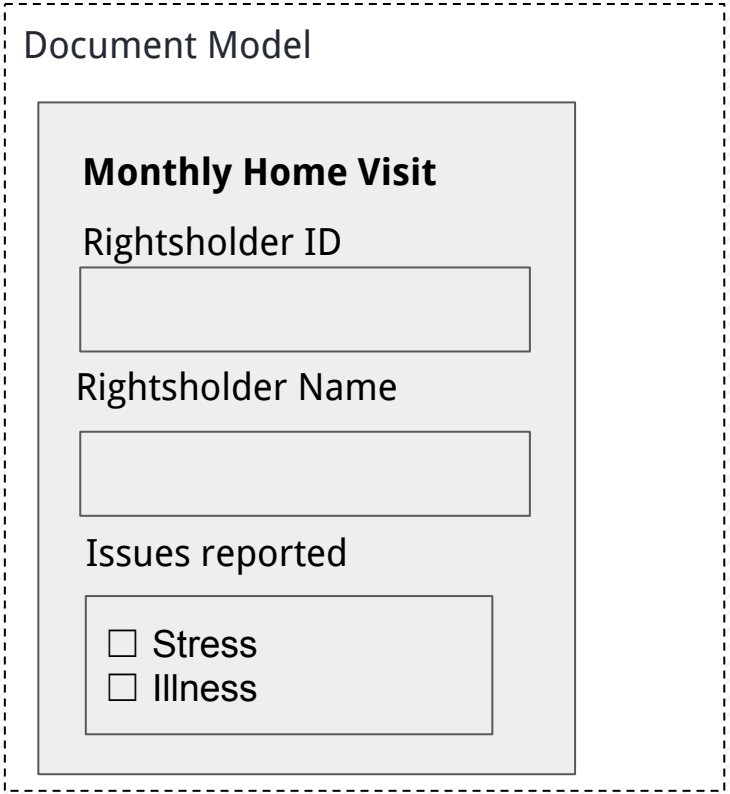
Relational vs Document Model





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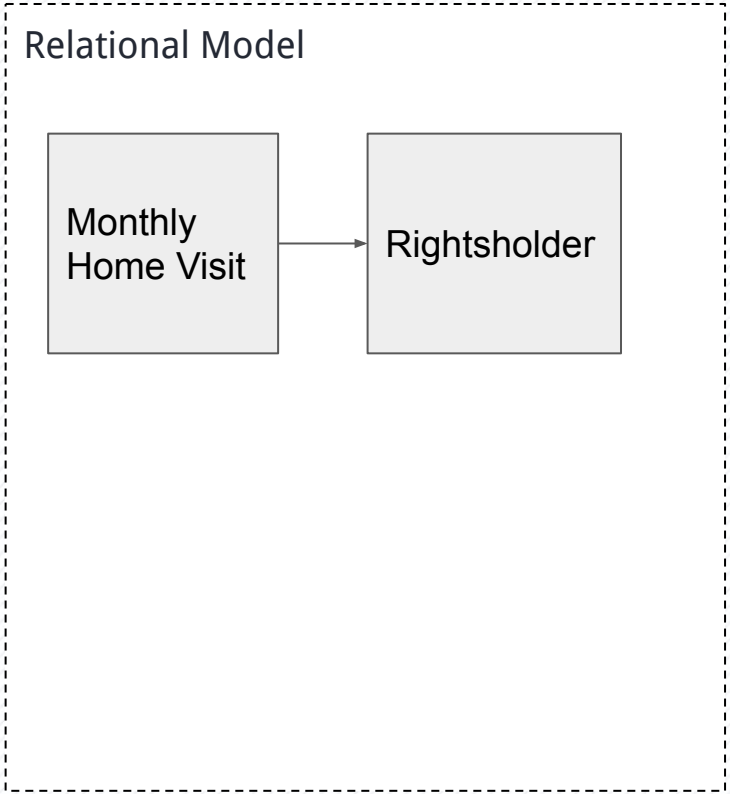
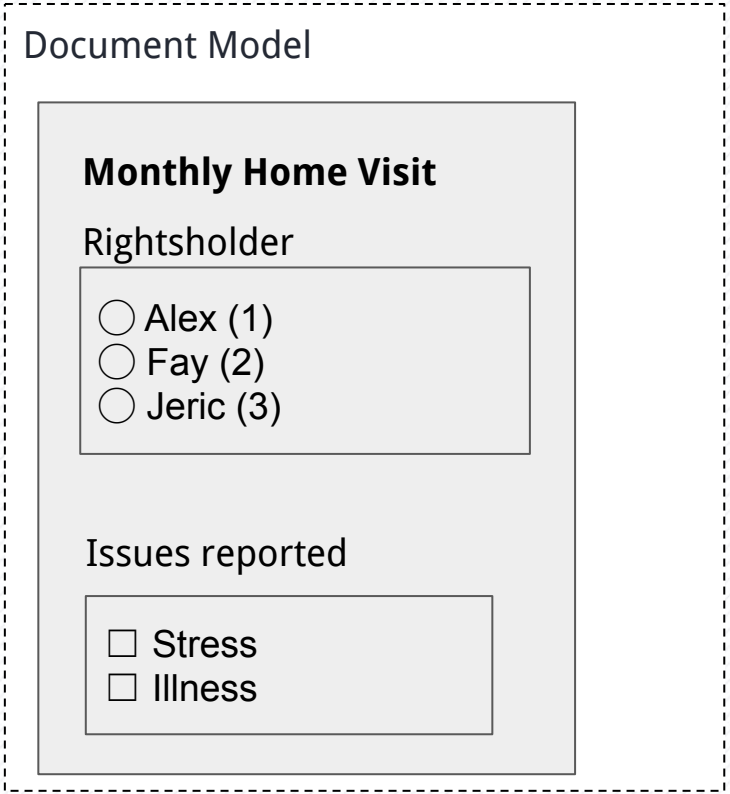
Relational vs Document Model





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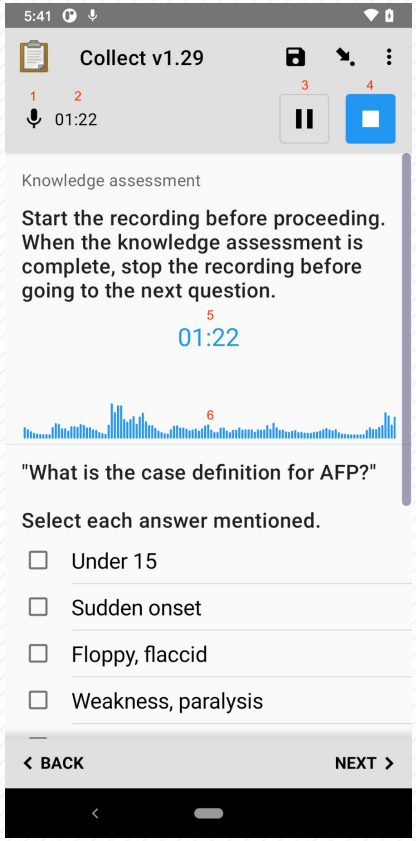
Relational <> Document Mismatch



Database table

Under_15	Sudden_ Onset	Floppy_ Flacid	Weakness_P aralysis
1	0	0	0
0	1	1	0
0	1	0	0
0	0	0	0

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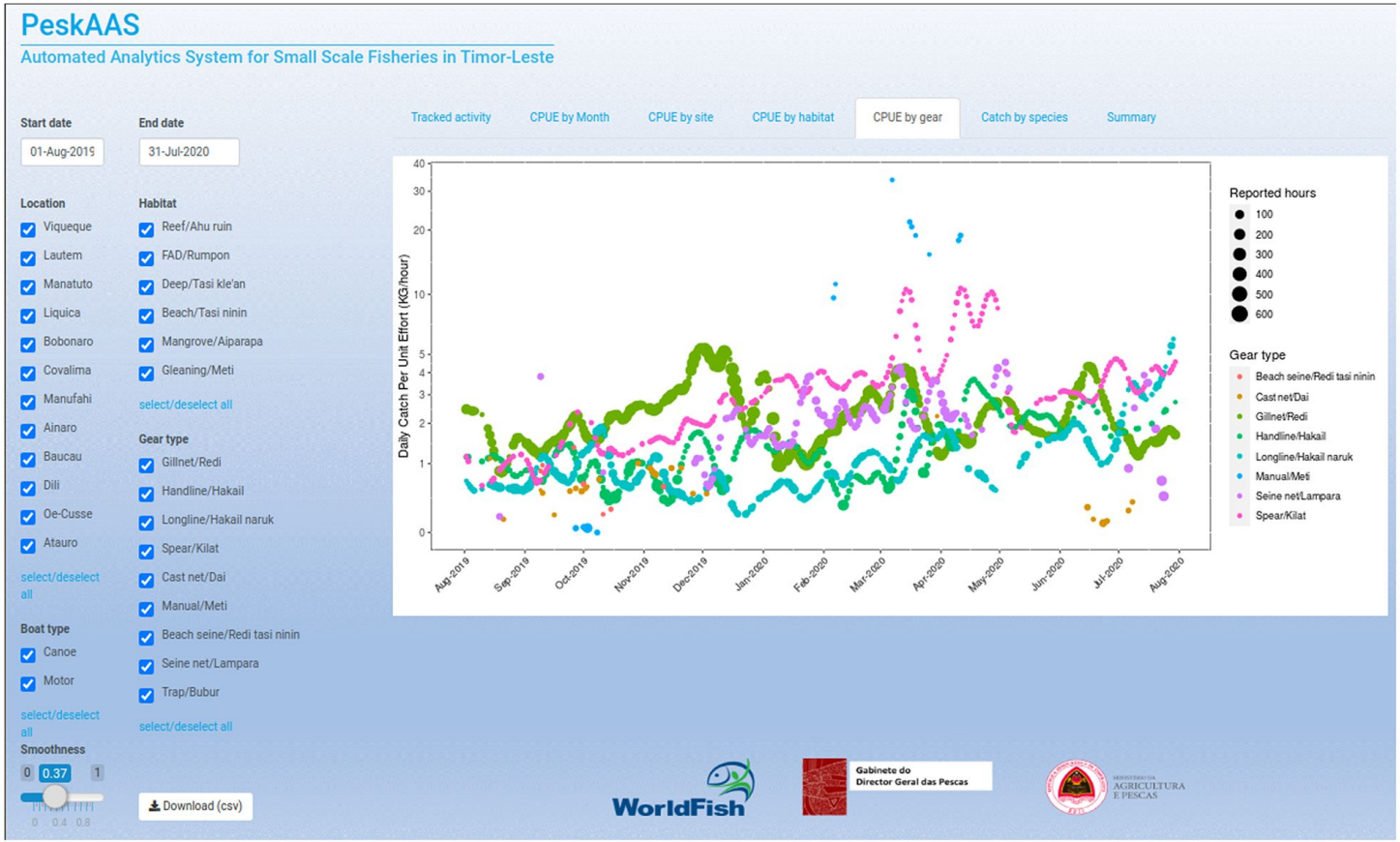
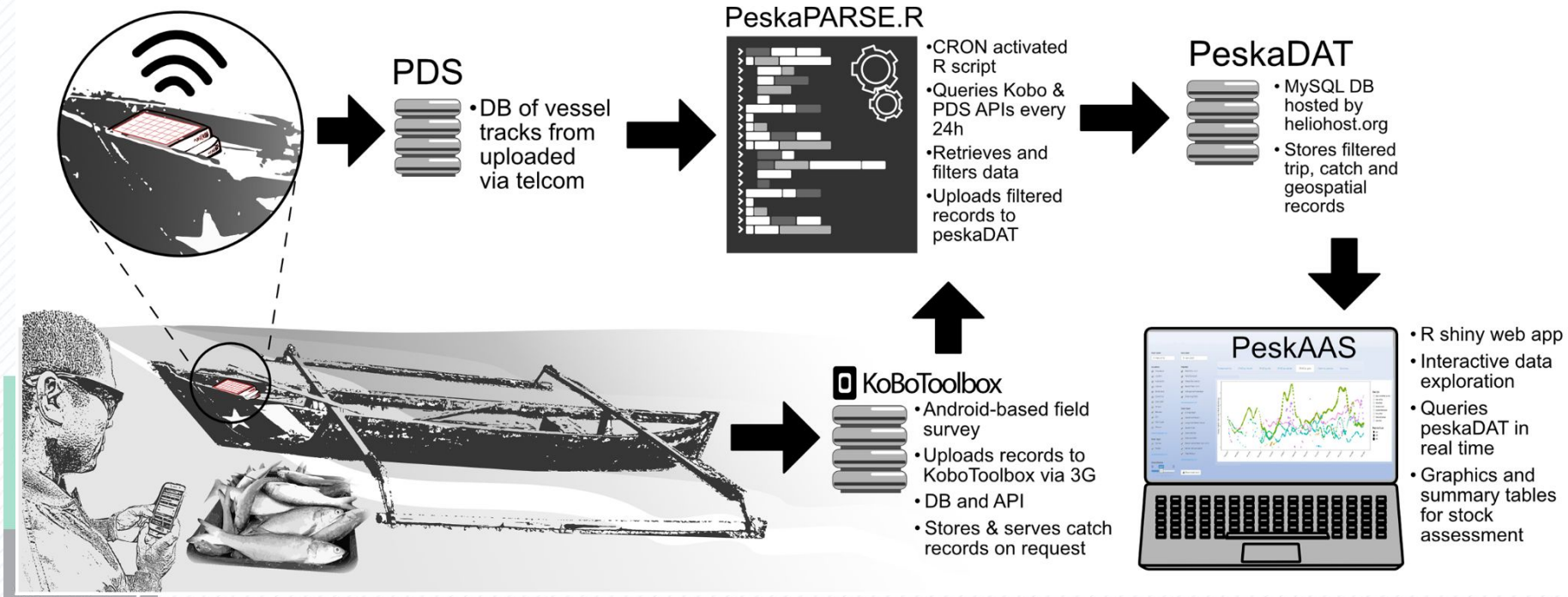
Analyzing small-scale fisheries in Timor Leste: PeskAAS



PeskAAS



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https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0234760

ActivityInfo: Bridging the Gap

Combining the Document and Relational Models

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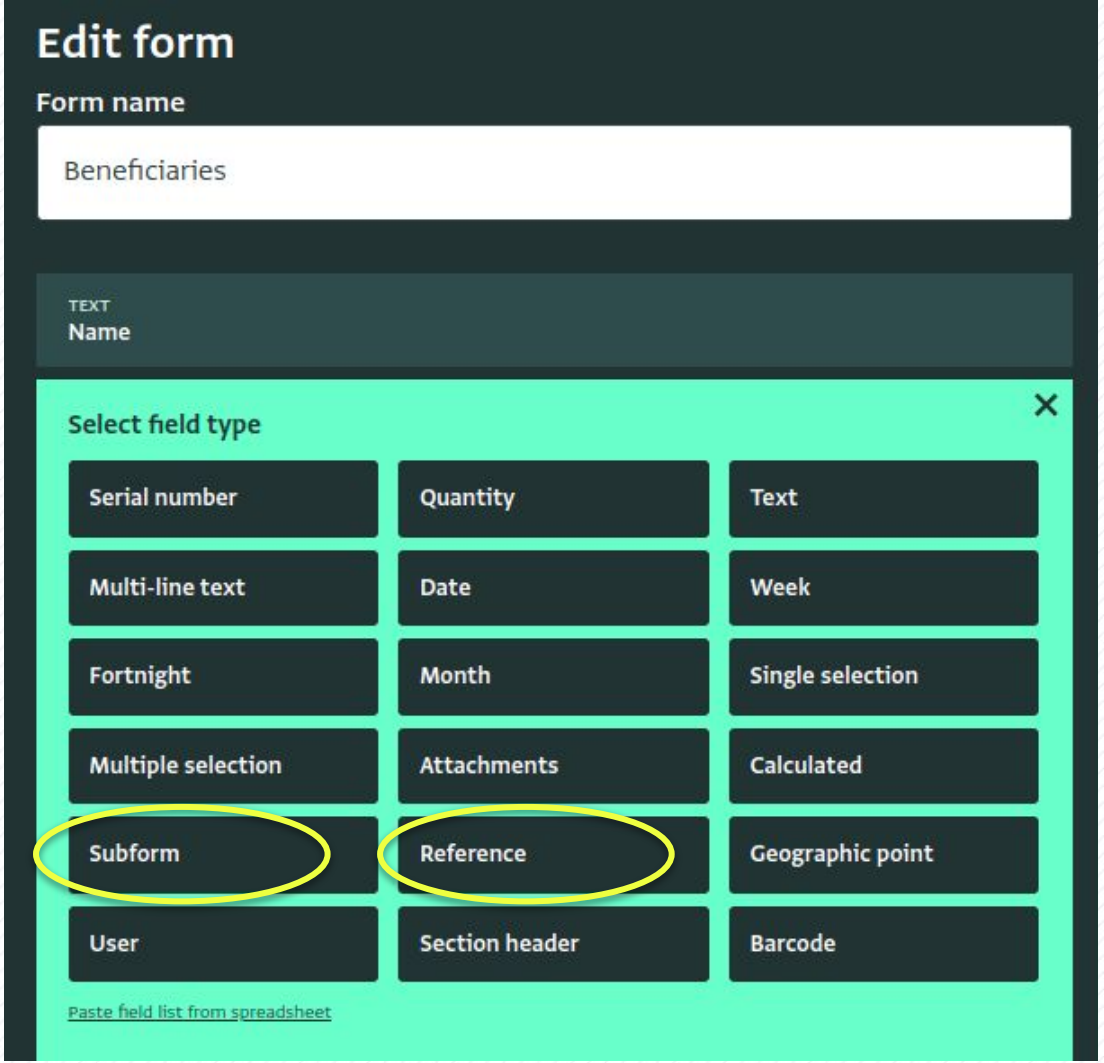

Reference Field Type

- Establishes a link between forms
- Allows user-friendly selection of related record
- Behind the scenes, stores the related record's unique primary key

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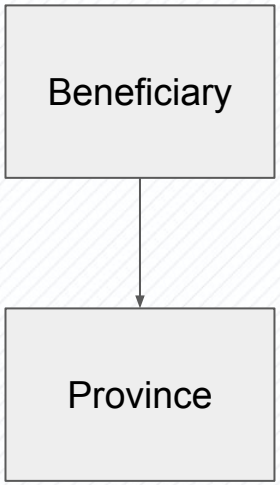
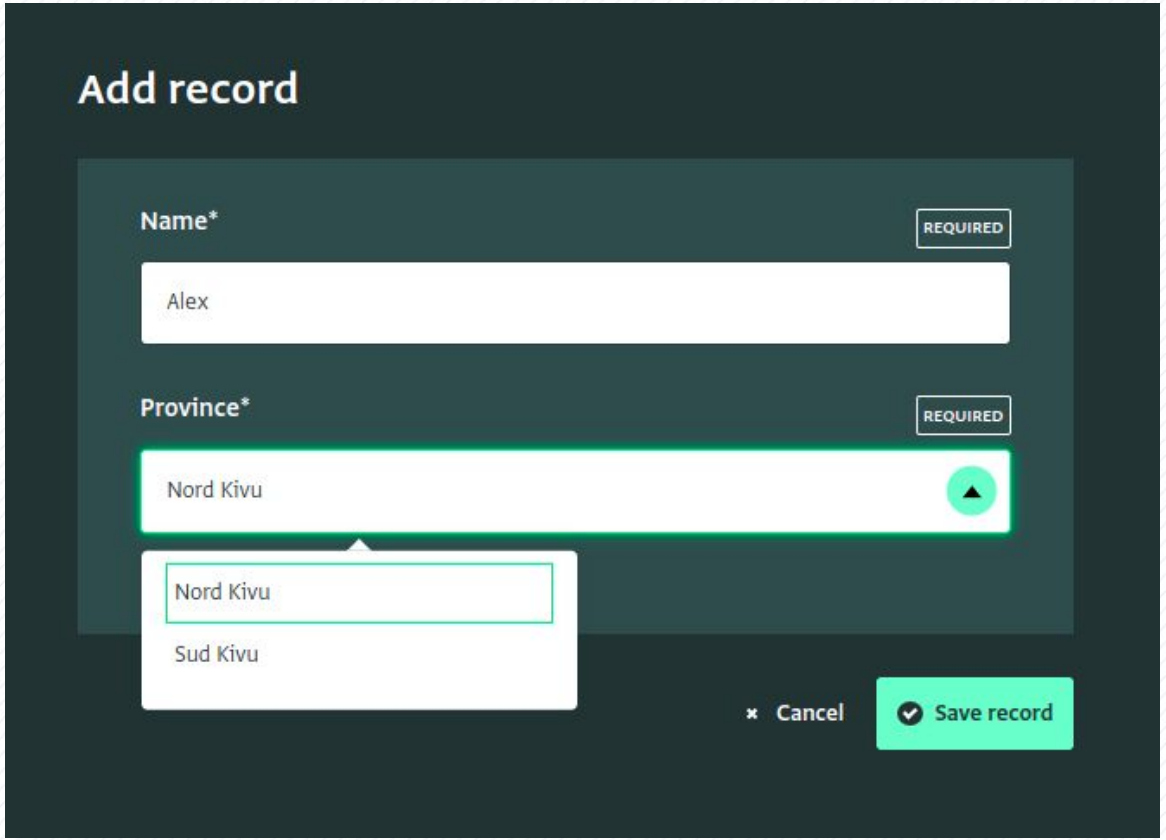
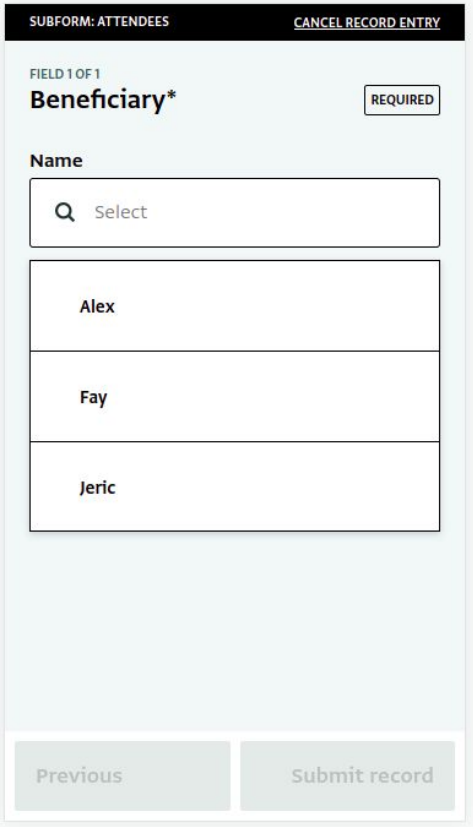
From model to user interface





Activity Info

From model to (mobile) user interface



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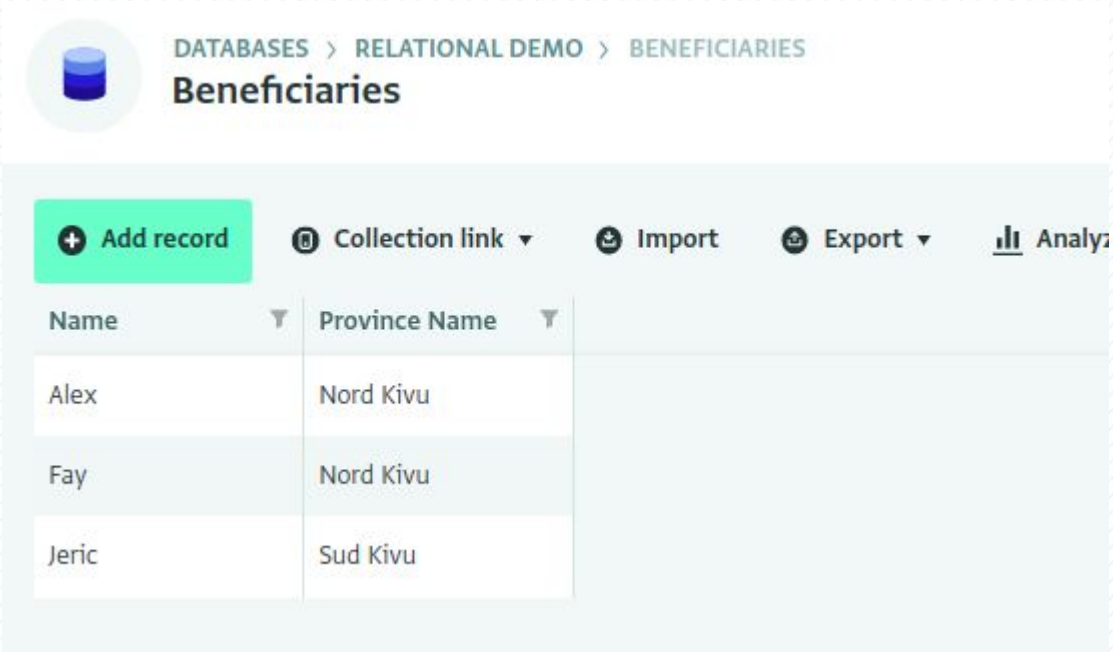
Display Natural Keys for users…



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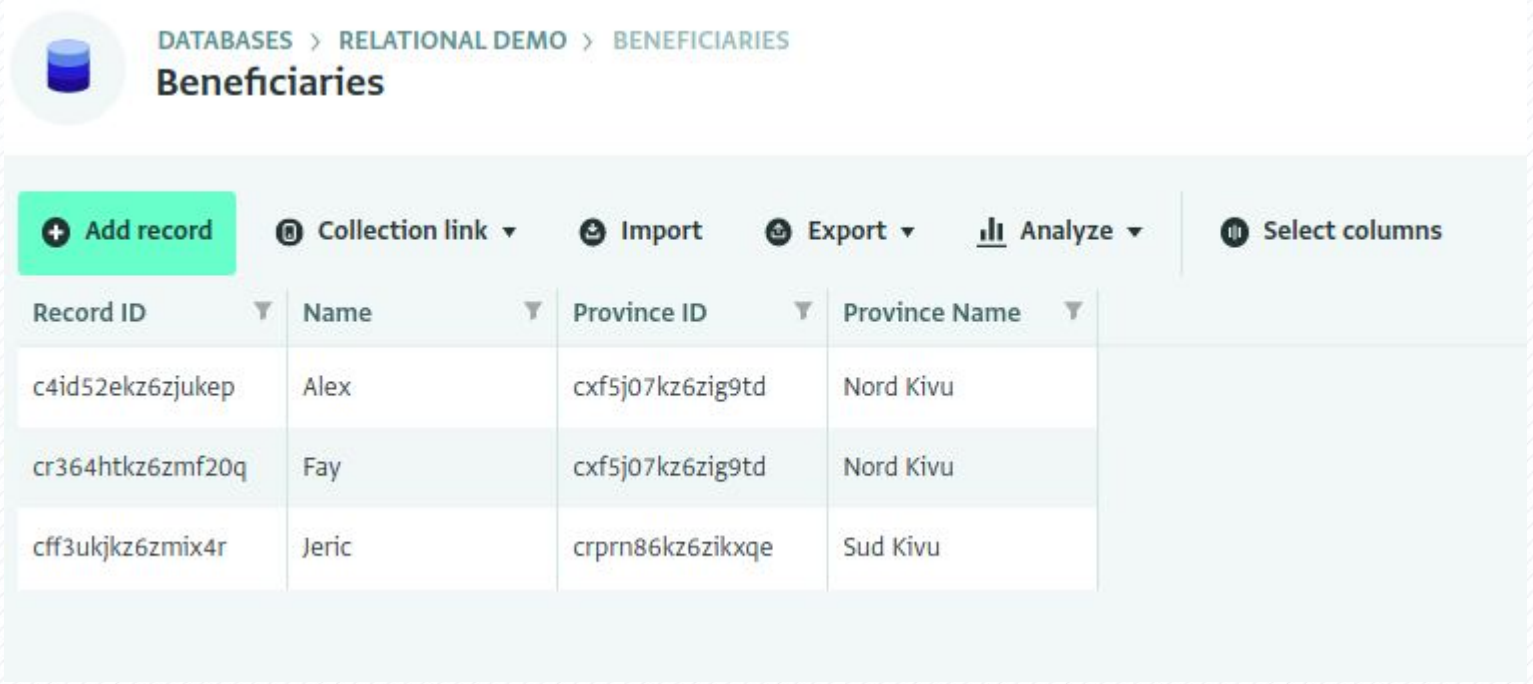
Surrogate IDs for data integrity



Activity Info

From Offline Collection to Replication

Old: Offline collection

1. Download form
2. Complete form offline
3. Submit form to server when online

ActivityInfo: Offline Replication

1. Synchronize entire database to offline replica on mobile phone or web browser

2. View, edit, add, change while offline and disconnected

3. Synchronize automatically when a connection becomes available.

Activity Info

Thank you!

Questions?

Please add your questions to the Q&A section!

Self-paced course on ActivityInfo

Free trial of ActivityInfo

Schedule a call with me!

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