

Credit Score Calculation Using Distributed Databases

Build a system that:

- **Connects to 4 distributed databases + 1 User Database**
- **Generate user credit-related data**
- **Calculates credit score (iScore) based on predefined factors**
- **Displays the result to the user**

The score is based on 4 main factors:

1. Payment History (35% of the score)

What it means:

Have you paid your bills on time?

Example:

Imagine you were supposed to pay your credit card 10 times this year. If you paid on time 9 times and were late once, your on-time payment rate is:

$$\mathbf{(9 / 10) * 100 = 90\%}$$

2. Outstanding Debt (30% of the score)

What it means:

How much of your credit limit are you using?

Example:

If the bank gave you a credit limit of 10,000 EGP, and you spent 5,000 EGP, your utilization is:

$$**$(5000 / 10000) = 50\%$**$$

The formula does:

$$**$(1 - 0.5) * 100 = 50\%$**$$

Using less of your allowed money is good.

If you always max out your credit cards, banks get nervous.

3. Credit History Age (15% of the score)

What it means:

How long have you been using credit (loans, credit cards, etc)?

Example:

- **If someone started using credit 1 year ago, their age is low.**
- **Someone who started 10 years ago has a longer history — banks like that more.**

So if the max possible age is 10 years, and your account is 5 years old:

$$**$(5 / 10) * 100 = 50\%$**$$

4. Credit Mix (20% of the score)

What it means:

Do you use different types of credit or just one?

Example:

- If you only use a credit card = 1 type
- If you use a credit card + car loan + mortgage = 3 types

Say the system tracks 5 possible types of credit, and you're using 2:

$$(2 / 5) * 100 = 40\%$$

$$\text{finalScore} = 0.35 * \text{paymentScore} + 0.30 * \text{debtScore} + 0.15 * \text{historyScore} + 0.20 * \text{mixScore}$$

Example:

<i>Metric</i>	<i>Value</i>
<i>On-time payments</i>	<i>18</i>
<i>Total payments</i>	<i>20</i>
<i>Used credit</i>	<i>3,000 EGP</i>
<i>Credit limit</i>	<i>10,000 EGP</i>
<i>Account age</i>	<i>3 years</i>
<i>Max possible age</i>	<i>10 years</i>
<i>Credit types used</i>	<i>2</i>
<i>Total types tracked</i>	<i>4</i>

1. Payment History Score

$$(18 / 20) * 100 = 90$$

2. Outstanding Debt Score

$$(1 - (3000 / 10000)) * 100 = (1 - 0.3) * 100 = 70$$

3- Credit History Age Score

$$(3 / 10) * 100 = 30$$

4. Credit Mix Score

$$(2 / 4) * 100 = 50$$

finalScore =

$$0.35 * 90 +$$

$$0.30 * 70 +$$

$$0.15 * 30 +$$

$$0.20 * 50$$

$$= 31.5 + 21 + 4.5 + 10 = 67$$

$$\text{scaledScore} = 300 + ((67 / 100) * (850 - 300))$$

$$= 300 + (0.67 * 550)$$

$$= 300 + 368.5 = \textbf{668.5}$$

- $67 / 100 \rightarrow$ This turns your score into a percentage (in this case, 67%)
- $850 - 300 = 550 \rightarrow$ This is the total range of credit scores
- $(67 / 100) * 550 = 368.5 \rightarrow$ This gives how much of the range your score deserves
- $300 + 368.5 = 668.5 \rightarrow$ Then we add that to the minimum credit score (300)

Database Architecture

Setup: One Database per Credit Score Factor:

Database Name	Contains Info For...	Related Factor
<i>payments_db</i>	<i>Payment records</i>	<i>Payment History</i>
<i>debt_db</i>	<i>Credit limits & usage</i>	<i>Outstanding Debt</i>
<i>history_db</i>	<i>Account opening dates</i>	<i>Credit History Age</i>
<i>mix_reference_db</i>	<i>User's credit types & total system types</i>	<i>Credit Mix</i>

Don't forget a database for users so you can get the user id and store into each database so you know which users the records related to!

How Are the Databases Connected?

Each database is separate, but they all share one key thing:

Every table or collection includes a user_id field

That's your link between data from different sources