Case Study Brief - Data Analyst 2025

Focus: Success Pattern Discovery • SQL Logic Design • AI-Powered Talent Matching • Business Storytelling

Overview

Company X is developing a **Talent Match Intelligence** system to help leaders identify what makes top-performing employees successful and to find individuals who share those characteristics for **succession.**

In this case, you'll simulate the real data-analysis workflow behind that system.

You will:

1. **Discover** what drives employee success.
2. **Formalize** those drivers into a clear, explainable **Success Formula**.
3. **Translate** that logic into **SQL** that computes match scores.
4. **Present** your findings through a lightweight **AI-powered app** and **dashboard** that generates job profiles and visual insights.

⚠ Important Note:

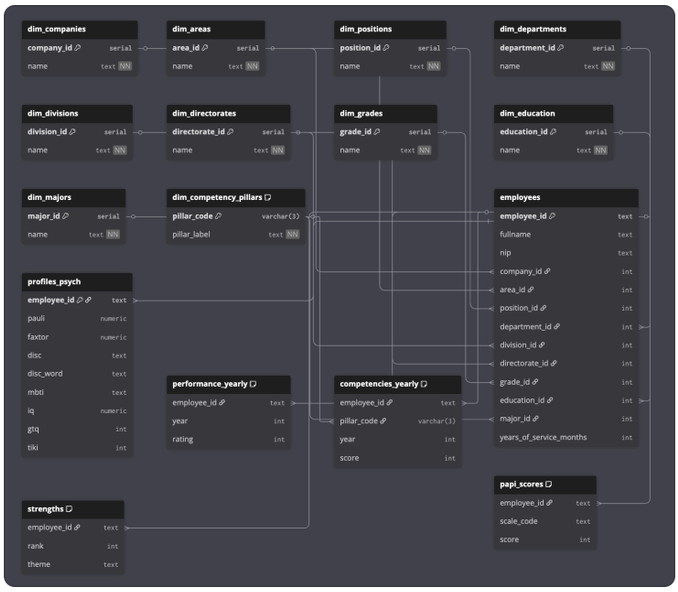
In real-world analytics, you rarely start with complete knowledge. This case study is designed to test your ability to **learn, explore, and adapt**. If you don't have an HR or psychology background, you're expected to research and understand key terms and metrics yourself.
Saying "I'm not familiar" is **not an acceptable limitation**. Discovering what you don't know and translating it into actionable analysis **is the job itself**.

Tools You'll Need

Category	Tool / Platform	Notes
Database	**Supabase** (Postgres)	For data storage, queries, and SQL logic
Programming & Analysis	**Python / R / SQL**	For analysis, queries, and formula exploration
Visualization & App	**Streamlit**, or any enterprise-grade dashboard framework	For insight dashboards and job vacancy visualizations
AI Model	**OpenRouter** (or any free LLM)	To generate job requirements, descriptions, and competency lists
Version Control	**GitHub**	For sharing scripts and documentation
Report Format	**PDF (Case Study Report)**	Final submission format (see template)

Dataset & ERD

You'll use the dataset `Study Case DA`, Glossary Data, modeled using the ERD provided below.



Key Entities

Category	Main Tables	Description
Employee & Structure	`employees`, `dim_companies`, `dim_directorates`, `dim_positions`, `dim_grades`, etc.	Organizational context and employee profile.
Performance	`performance_yearly`	Annual rating (1–5). **High performers = rating 5.**
Assessments	`profiles_psych`, `papi_scores`, `strengths`	Cognitive, psychometric, and behavioral data.
Competencies	`competencies_yearly`, `dim_competency_pillars`	Yearly competency scores and soft skills.

This schema provides complete coverage of behavioral, cognitive, and organizational attributes.

Case Study Flow - The Red Thread

Step 1 - Discover the Pattern of Success

Your first objective is to identify *why* some employees achieve **rating 5** while others don't.
Perform data exploration and visualization to uncover what differentiates high performers across:

- Competency pillars (`competencies_yearly` + `dim_competency_pillars`)
- Psychometric profiles (`papi_scores`, `profiles_psych`)
- Behavioral data (`strengths`)
- Contextual factors (`grade`, `years_of_service_months`, `education`, etc.)

Use storytelling visuals (heatmaps, radar charts, correlation plots, comparison matrices) to explain the **why**, not just the **what**.

Then, synthesize those findings into a **Success Formula**, a weighted structure that captures how performance emerges from multiple factors.

⚠ **Note:** Any example like

```
SuccessScore = 0.3*Cognitive + 0.2*Leadership + ...
```

is **oversimplified**.

The real challenge is to balance *many interacting variables*, across competencies, assessments, and traits, into one explainable success framework.

Deliverable:

- Final **Success Formula** with justification.
- Supporting analysis and visuals demonstrating how it was derived.

Understanding Talent Group Variables (TGV) and Talent Variables (TV)

Before moving into the SQL logic, it's important to understand how company X conceptualizes the building blocks of success.

- **Talent Group Variables (TGV)** represent **broad skill or behavioral categories** that affect performance.
  Examples: *Leadership*, *Cognitive Ability*, *Personality*, *Teamwork*, *Technical Expertise*.
- **Talent Variables (TV)** are **specific measurable components** within each TGV.
  Examples:
  - Under *Cognitive Ability*: *IQ Score*, *Numerical Reasoning*, *Problem Solving*
  - Under *Leadership*: *Decision Making*, *Strategic Thinking*, *Accountability*

Every TV contributes to its parent TGV.
In your SQL logic, you will:

1. Compare each **TV** between the candidate and benchmark (TV match rate).
2. Aggregate those into **TGV match rates** (group-level averages).
3. Combine all TGVs into a **Final Match Rate** (overall fit score).

> In short:
> **TV = individual measurable variable**
> **TGV = category grouping of related TVs**
> Both are essential for interpreting talent alignment.

You can check the detail **Talent Group Variables (TGV) and Talent Variables (TV)** here.

Step 2 - Operationalize the Logic in SQL

Managers pick one or more **talent benchmarks** (rating = 5) to define an ideal profile for a vacancy.
Your SQL must calculate how closely every employee matches that benchmark.

talent_benchmarks table

Column	Description
`job_vacancy_id`	Unique role ID
`role_name`	Job title
`job_level`	Level / grade
`role_purpose`	1–2 sentence summary
`selected_talent_ids`	Array of benchmark employee IDs
`weights_config`	Custom weights per TV or TGV

Weights may be **equal or custom** at both TV and TGV levels.

Matching Algorithm

Use modular CTEs to implement the logic below.

1. **Baseline Aggregation (on the fly)**
   a. For each TV, compute a **benchmark baseline** (median of selected talent scores).
2. **TV Match Rate (Employee × TV)**
   a. For **numeric variables**:
   Compare the employee's score directly against the baseline.
   Example:
      i. If benchmark IQ = 110 and candidate IQ = 100 → match rate = 100 / 110 = 90.9 %.
      ii. If scoring direction is "lower is better", invert the ratio: `((2 * benchmark_score - user_score) / benchmark_score) * 100`.
   b. For **non-numeric / categorical variables**:
   Use boolean comparison, i.e., exact match = 100 %, no match = 0 %.
3. **TGV Match Rate (Employee × TGV)**
   a. Average the TV match rates within each TGV.
   b. Apply equal or custom TV weights if provided.

4. **Final Match Rate (Employee)**
    a. Weighted average across all TGVs.
    b. Apply equal or custom weights from `weights_config`.

Expected SQL Output Columns

Column	Meaning
`employee_id`	Candidate ID
`directorate`	Directorate
`role`	Position title
`grade`	Grade / level
`tgv_name`	Talent Group Variable (e.g., Cognitive)
`tv_name`	Talent Variable (e.g., Strategic Thinking)
`baseline_score`	Benchmark average for this TV
`user_score`	Candidate score for this TV
`tv_match_rate`	Match % for this TV
`tgv_match_rate`	Avg/weighted match within TGV
`final_match_rate`	Weighted overall match %

Deliver → a well-documented SQL script producing this table with comments explaining each step.

Step 3 - Build the AI Talent App & Dashboard

Your final step is to turn the SQL results into actionable insight through an a parameterized, **AI-powered interface** and **visual dashboard**. This app must handle any new input at runtime, not a static or pre-baked dashboard.

The goal is to demonstrate how you can **process, visualize, and narrate data** to bring clarity, **not** to build a production-grade web app.

> ⚠ **Important Note:**
> The focus is **not on app development or UI polish**.
> We're evaluating your ability to **transform complex data into meaningful visuals and business insights**.
> Think like an *analyst who can code for clarity*, not a software engineer

Inputs (runtime, user-provided)

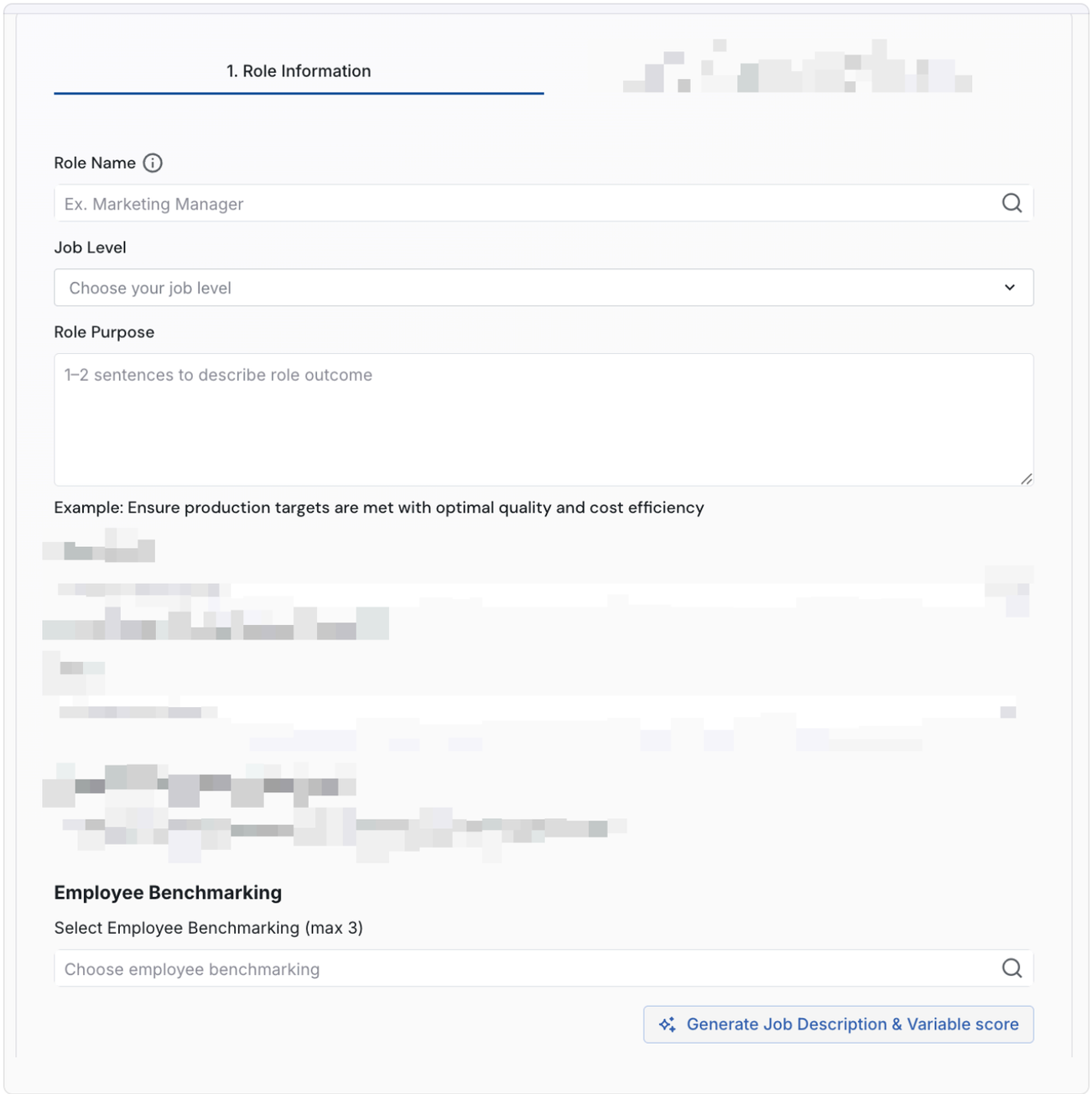
- Role name
- Job level
- Role purpose
- Selected benchmark employee IDs

When the user submits new inputs, your logic must:

1. Record or parameterize a new job_vacancy_id inside talent_benchmarks,
2. Recompute baselines dynamically from the selected benchmark employees,
3. Re-run your parameterized SQL query, and
4. Regenerate the profile, ranking, and visuals without editing the code.

Example:

Column	Desc
Role Name	Data Analyst
Job Level	Middle
Role	Data Analyst
Selected benchmark employee IDs	312, 335, 175



Outputs

1. **AI-Generated Job Profile**
   - Job requirements, description, and key competencies (generated via any LLM, e.g., OpenRouter).

Column	Desc
Job requirements	**SQL expertise**: complex joins, window functions, CTEs, performance tuning basics. **R or Python** for analysis (pandas/dplyr), statistics, and quick prototyping (Streamlit/Shiny/Dash). **BI tooling**: Looker/Power BI/Tableau (modeling, permissions, and production dashboards). **Data modeling** fundamentals (star schema, slowly changing dims, metrics layer) and version control. **Visualization** best practices and **data storytelling** for non-technical audiences. Strong **analytical thinking**: hypothesis framing, causal caveats, sensitivity checks. **Bias & fallacy awareness**: sampling bias, survivorship, p-hacking, confirmation bias; practices to mitigate. Communication in **English & Bahasa**; stakeholder management across levels.

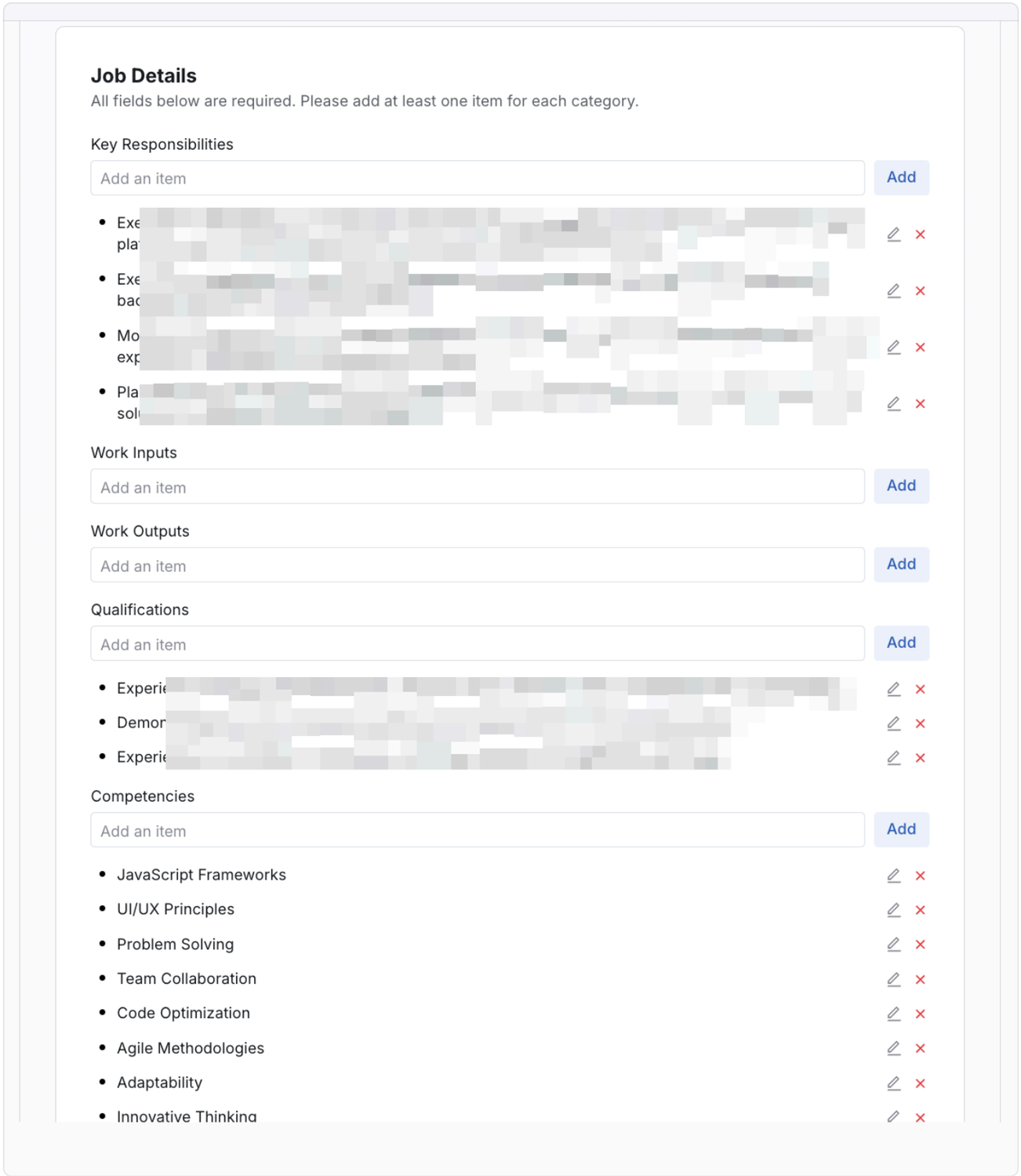
Job description	You turn business questions into data-driven answers. You'll own the analysis cycle end-to-end: understand context, shap clear dashboards, and craft narratives that drive decisions. You balance **technical depth** (SQL, R/Python, BI) with **busines** rigorous **thinking**, and **bias-aware** judgement.
key competencies	**SQL** (Postgres/Snowflake/BigQuery), **Git**, **DBT** (nice), **Airflow** (nice) **R/Python** (pandas/numpy/scipy or tidyverse), **Streamlit/Shiny**

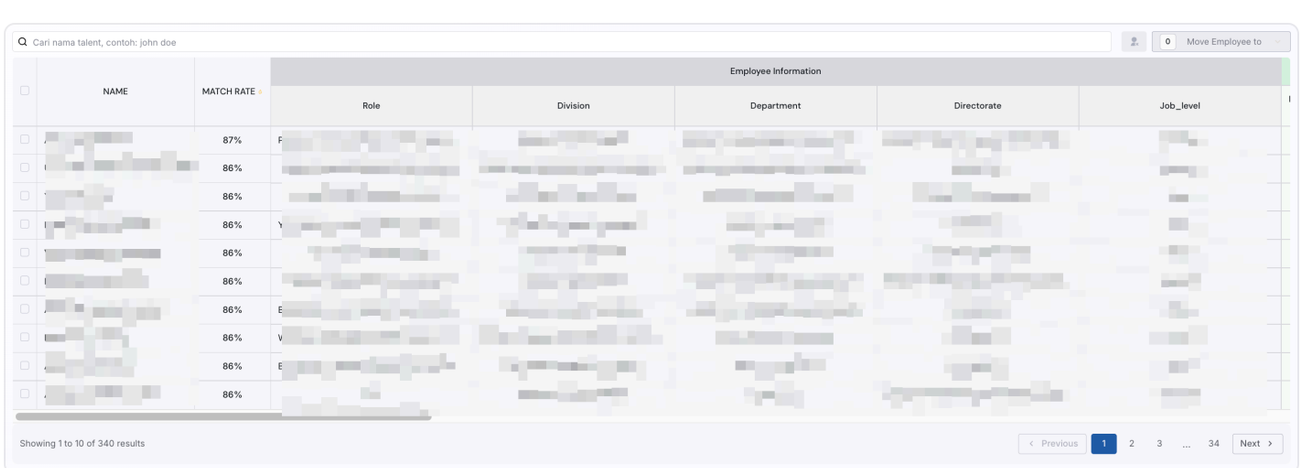
1. **Ranked Talent List**
    - Display the output of your SQL logic (at minimum): employee_id, name, final_match_rate, and supporting fields (e.g., top TGVs/TVs, strengths, gaps)
2. **Dashboard Visualization**
    - Provide clear, interactive visuals for each new input/job vacancy:
    - Match-rate distributions
    - Top strengths and gaps across TGVs
    - Benchmark vs candidate comparisons (radar, heatmap, bar plots)
    - Summary insights explaining why certain employees rank highest
    - ✅ The dashboard should let stakeholders see and understand the data.
    - ❌ It should not focus on UI frameworks, routing, or authentication.

Deliverable:

- Working app/dashboard that connects your SQL logic, AI generation, and visual insight.

Example





Glossary

Assessment Context

PAPI Kostick (Work Preferences)

- **What:** Work-style preferences (initiative, leadership, conformity, etc.).
- **In data:** `papi_scores` (scales `Papi_N … Papi_W`, 1–9).
- **Note:** Some scales are **inverse** in the match logic (watch the Z/K-style inversions).

MBTI (Type Preference)

- **What:** Four dichotomies (e.g., E/I, S/N, T/F, J/P) for preference, not ability.
- **In data:** `profiles_psych.mbti` (text; may be messy casing/spaces).
- **Note:** Clean to 16 valid types if needed.

DISC (Behavioral Style)

- **What:** Dominance, Influence, Steadiness, Conscientiousness preferences.
- **In data:** `DISC`, `first_char/second_char`, `first_word/second_word`, `DISC_word`.
- **Note:** Useful for narrative fit.

IQ / Cognitive Index

- **What:** General cognitive/problem-solving potential (proxy).
- **In data:** `profiles_psych.iq` (approx. 80–140).
- **Note:** If included, treat extremes/outliers carefully (bias risk).

GTQ (Aptitude Subtests)

- **What:** Short cognitive/aptitude components (e.g., reasoning, numeracy).
- **In data:** `GTQ1-GTQ5` (1–10), `GTQ_total`.

TIKI (Short Cognitive/Attention Tasks)

- **What:** Brief attention/processing subtests.
- **In data:** `Tiki1-Tiki4` (1–10).

Pauli (Kraepelin-type Mental Arithmetic)

- **What:** Continuous addition task, **speed + accuracy + mental stamina**.
- **In data:** `profiles_psych.pauli` (numeric 20–100 in this dummy).

Faxtor (Internal Cognitive/Attention Index)

- **What:** Internal composite (attention/processing) used in the dummy.
- **In data:** `profiles_psych.faxtor` (numeric 20–100).

CliftonStrengths (Top Themes)

- **What:** Talent themes (e.g., Achiever, Strategic, Learner) reflecting natural patterns.
- **In data:** `strengths` with **rank 1–14** (theme names).

Data Dictionary

1) Core Dimensions

1.1 `dim_companies`

Purpose: Organization entity.

- `company_id` · `int` · PK · surrogate key.
- `name` · `text` · **Unique, NOT NULL**.

1.2 `dim_areas`

Purpose: Work area / site.

- `area_id` · `int` · PK.
- `name` · `text` ·

1.3 `dim_positions`

Purpose: Role family / position.

- `position_id` · `int` · PK.
- `name` · `text` · e.g., “Data Analyst”, “Brand Manager”. **Unique**.

1.4 `dim_departments`

Purpose: Department.

- `department_id` · `int` · PK.
- `name` · `text` · e.g., “Marketing”, “HR”, “IT”. **Unique**.

1.5 `dim_divisions`

Purpose: Division.

- `division_id` · `int` · PK.
- `name` · `text` · division label.

1.6 `dim_directorates`

Purpose: Directorate.

- `directorate_id` · `int` · PK.
- `name` · `text` · e.g., “HR & Corporate Affairs”, “Commercial”.

1.7 `dim_grades`

Purpose: Job grade/band.

- `grade_id` · `int` · PK.
- `name` · `text` · e.g., “III”, “IV”, “V”.

1.8 `dim_education`

Purpose: Highest education.

- `education_id` · `int` · PK.
- `name` · `text` · e.g., “SMA”, “D3”, “S1”, “S2”.

1.9 `dim_majors`

Purpose: Field of study.

- `major_id` · `int` · PK.
- `name` · `text` · e.g., “Psychology”, “Engineering”.

1.10 `dim_competency_pillars` *(Historical competency pillars)*

Purpose: Pillars used in historical competency ratings.

- `pillar_code` · `varchar(3)` · PK · e.g., `GDR`, `CEX`, `IDS`, `QDD`, `STO`, `SEA`, `VCU`, `LIE`, `FTC`, `CSI`.
- `pillar_label` · `text` · human-readable label.

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2) Core Entities / Facts

2.1 `employees`

Purpose: Person master.

- `employee_id` · `text` · PK · unique internal ID.
- `fullname` · `text`.
- `nik_baru` · `text`.
- `company_id` · `int` · FK → `dim_companies`.
- `area_id` · `int` · FK → `dim_areas`.
- `position_id` · `int` · FK → `dim_positions`.
- `department_id` · `int` · FK → `dim_departments`.
- `division_id` · `int` · FK → `dim_divisions`.
- `directorate_id` · `int` · FK → `dim_directorates`.

- `grade_id` · `int` · FK → `dim_grades`.
- `education_id` · `int` · FK → `dim_education`.
- `major_id` · `int` · FK → `dim_majors`.
- `years_of_service_months` · `int` · 0–180 typical.

2.2 `profiles_psych` (one row per employee)

Purpose: Non-yearly psychometric profile & derived fields.

- `employee_id` · `text` · PK, FK → `employees`.
- `pauli` · `numeric` · ~20–100 (dummy).
- `faxtor` · `numeric` · ~20–100 (dummy).
- `disc` · `text` · e.g., “DI”, “SC” (messy variants possible).
- `first_char`, `second_char` · `text` · D/I/S/C.
- `first_word`, `second_word`, `disc_word` · `text`.
- `enneagram` · `int` · 1–9.
- `mbti` · `text` · 16 types (messy casing/spaces may occur).
- `iq` · `numeric` · ~80–140 (dept-level missingness possible).
- `gtq1..gtq5` · `int` · 1–10.
- `gtq_total` · `int`.
- `tiki1..tiki4` · `int` · 1–10.

2.3 `papi_scores`

Purpose: PAPI Kostick scales (work preferences).

- `employee_id` · `text` · FK.
- `scale_code` · `text` · in {`Papi_N`, `Papi_G`, `Papi_A`, `Papi_L`, `Papi_P`, `Papi_I`, `Papi_T`, `Papi_V`, `Papi_X`, `Papi_S`, `Papi_B`, `Papi_O`, `Papi_R`, `Papi_D`, `Papi_C`, `Papi_Z`, `Papi_E`, `Papi_K`, `Papi_F`, `Papi_W`} (set may vary by form).
- `score` · `int` · **1–9**.
  PK: (`employee_id`, `scale_code`)

2.4 `strengths`

Purpose: CliftonStrengths themes (Top 14).

- `employee_id` · `text` · FK.
- `rank` · `int` · **1..14** (unique per employee).
- `theme` · `text` · from Gallup’s 34 themes (e.g., Achiever, Strategic, Learner, Relator, etc.).
  PK: (`employee_id`, `rank`)

2.5 `performance_yearly`

Purpose: Annual performance.

- `employee_id` · `text` · FK.
- `year` · `int` · 2021–2025.
- `rating` · `int` · **1–5** (some outliers injected).
  PK: (`employee_id`, `year`)

2.6 `competencies_yearly`

Purpose: Historical competency ratings (10-pillar model).

- `employee_id` · `text` · FK.
- `pillar_code` · `varchar(3)` · FK → `dim_competency_pillars`.
- `year` · `int` · 2021–2025.
- `score` · `int` · **1–5**.
  PK: (`employee_id`, `pillar_code`, `year`)

Note: This is **not** the new TGV framework; it’s historical context.

2.7 `employee_archetypes`

Purpose: Top-3 archetypes per employee (from flags).

- `employee_id` · `text` · FK.
- `archetype_code` · `text` · FK → `dim_archetypes`.
  PK: (`employee_id`, `archetype_code`)

Submission Package

Please compile your submission into a **single Case Study Report (PDF)** following the structure below.

Candidate Information

- **Full Name:**
- **Email Address:**

Repository Link

- Provide a direct link to your GitHub repository containing all source files.
- ⚠ **Important:** Do **not** use the word **"Rakamin"** anywhere in your repository name, commits, or documentation. This is to reduce plagiarism risk.
- Example:
  `github.com/username/talent-match-intelligence`

Your repository must include:

- SQL scripts
- App code and dashboard
- `README.md` with setup instructions
- Any supporting assets (datasets, configuration files, etc.)

Main Report

Your report should be clear, concise, and business-ready.
Use the following structure:

1. **Executive Summary**
   - Brief overview of the project
   - Objectives, key outcomes, and impact
2. **Success Pattern Discovery (Deliverable #1)**
   - Analysis process, findings, insights, and visualizations
   - Final **Success Formula** and its rationale
3. **SQL Logic & Algorithm (Deliverable #2)**
   - Explanation of your SQL approach
   - Query structure and CTE logic overview
   - Snapshot of output table (sample rows and key columns)
4. **AI App & Dashboard Overview**
   - Inputs and outputs of the AI module
   - Key visualizations and insight narratives
   - Example screenshots of your dashboard
5. **Conclusion**
   - Reflections, challenges, and improvement ideas

Additional Files (if any)

Attach or link to:

- Analysis notebooks (Python, Jupyter, etc.)
- Generated visuals or supporting documentation