**A Database of Climbs for a Mountaineering Club**

*The main purpose of creating a database for a mountaineering club is to efficiently manage and provide easy access to a wide range of information related to climbing routes, areas data equipments and rescue operations.*

The benefits are following:

* *Improved Safety and Organization* – Keep track of medical conditions, rescue operations, and equipment.
* *Better Planning* – Store detailed information about mountains, routes, and guides.
* *Efficient Record-Keeping* – Maintain a structured database for club activities.
* *Enhanced Communication* – Guides, climbers, and rescuers can access necessary details.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table**  **names** | **Keys** | **Descriptions** | **Attributes** | **Data type** |
| **area** | area\_ID (PK):  Unique identifier for an area | This table contains information about the area where mountain is located | * area\_ID (PK) * area\_name – name of the area * country – country where the area is located | int  varchar  varchar |
| Example with data for **area** table:   |  |  |  | | --- | --- | --- | | **area\_ID** | **area\_name** | **country** | | 1 | Kilimanjaro Range | Tanzania | | 2 | Andes Mountains | Argentina | | | | | |
| **mountain** | mountain\_ID (PK): Unique identifier for each mountain  area\_ID (FK) | Finds information about the name and height of the mountain | * mountain\_ID * area\_ID – the geographic area where the mountain is located * mountain\_name – name of the mountain * height\_meters – height of the mountain (in meters) | int  int  varchar  int |
| Example with data for **mountain** table:   |  |  |  |  | | --- | --- | --- | --- | | **mountain\_ID** | **area\_ID** | **mountain\_name** | **height\_meters** | | 1 | 1 | Kilimanjaro | 5895 | | 2 | 2 | Aconcagua | 6961 | | | | | |
| **route** | route\_ID (PK):  Unique identifier for each route  mountain\_ID (FK) | Here you can find the name and the difficulty rating of the route for climbing | * route\_ID * mountain\_ID – the mountain where the route is located * route\_name – name of the route * difficulty\_level – difficulty rating of the route | int  int  varchar  text |
| Example with data for **route** table:   |  |  |  |  | | --- | --- | --- | --- | | **route\_ID** | **mountain\_ID** | **route\_name** | **difficulty\_level** | | 1 | 1 | Machame Route | challenging | | 2 | 2 | Polish Glacier | extremely difficult | | | | | |
| **climb** | climb\_ID (PK) :  Unique identifier for each climb  mountain\_ID (FK)  route\_ID (FK)  guide\_ID (FK) | Contains details about climb, such as the date of the beginning and end of each climb etc. | * climb\_ID * mountain\_ID – the mountain being climbed * route\_ID – the planned route for the climb * guide\_ID – the guide assigned to the climb * start\_date – date when the climb begins * end\_date – date when the climb ends | int  int  int  int  date  date |
| Example with data for **climb** table:   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **climb\_ID** | **mountain\_ID** | **route\_ID** | **guide\_ID** | **start\_date** | **end\_date** | | 1 | 1 | 1 | 1 | |  |  | | --- | --- | | 2025-07-10 | 2025-07-17 | | |  |  | | --- | --- | | 2025-07-10 | 2025-07-17 | | | 2 | 2 | 2 | 2 | |  |  | | --- | --- | | 2025-12-10 | 2025-12-30 | | |  |  | | --- | --- | | 2025-12-10 | 2025-12-30 | | | | | | |
| **guide** | guide\_ID (PK):   * Unique identifier for a guide | This table stores first name, last name and phone number of the guide | * guide\_ID * guide\_first\_name – guide’s first name * guide\_last\_name – Guide’s last name * experience\_years – number of years of experience * guide\_phone\_number – contact number of the guide | int  varchar  varchar  int  text |
| Example with data for **guide** table:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **guide\_ID** | **guide\_first\_name** | **guide\_last\_name** | **experience\_years** | **guide\_phone\_number** | | 1 | Joseph | Mtui | 17 | +255 754 123 456 | | 2 | Miguel | Sanchez | 28 | +542 614 250 871 | | | | | |
| **climb\_note** | note\_ID (PK):  Unique identifier for the note  climb\_ID (FK)  climber\_ID (FK) | In this table you can see the content and the date of note about the climb written by a climber | * note\_ID * climb\_ID (FK) – the climb to which the note belongs * climber\_ID (FK) – the climber who wrote the note * note\_text – the actual note content * note\_date – the date when note was added | int  int  int  text  date |
| Example with data for **climb\_note** table:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **note\_ID** | **climb\_ID** | **climber\_ID** | **note\_text** | **note\_date** | | 1 | 2 | 1 | You must prepare for extreme cold and high winds | 2025-12-29 | | 2 | 1 | 2 | You need physical endurance due to long trekking days | 2025-07-16 | | | | | |
| **equipment** | equipment\_ID (PK):  Unique identifier for equipment  climber\_ID (FK) | It contains records information about equipment that use climber | * equipment\_ID (PK) * climber\_ID - the climber who owns the equipment * equipment\_name – name of the equipment * equipment\_type – type of equipment (like ropes, ice axe, tent) | int  int  text  text |
| Example with data for **equipment** table:   |  |  |  |  | | --- | --- | --- | --- | | **equipment\_ID** | **climber\_ID** | **equipment\_name** | **equipment\_type** | | 1 | 2 | Petzl Ice Axe | ice axe | | 2 | 1 | MSR Hubba Hubba Tent | tent | | | | | |
| **climber** | climber\_ID (PK): Unique identifier for each climber | Stores the name and addresses of the climbers involved | * climber\_ID * climber\_first\_name – climber’s first name * climber\_last\_name – climber’s last name * address – climber’s address | int  varchar  varchar  text |
| Example with data for **climber** table:   |  |  |  |  | | --- | --- | --- | --- | | **climber\_ID** | **climber\_first\_name** | **climber\_last\_name** | **address** | | 1 | Cristian | Luca | 12 Kogălniceanu Street, Chișinău, Moldova | | 2 | Monica | Luca | 164 Ștefan cel Mare Boulevard, Chișinău, MD-2004, Moldova | | | | | |
|  | | | | |
| **rescuer** | rescuer\_ID (PK) : Unique identifier for a rescuer | It stores the necessary data about rescuer in case of emergency | * rescuer\_ID * rescuer\_first\_name – rescuer’s first name * rescuer\_last\_name – rescuer’s last name * organization – the organization they belong to * rescuer\_contact – contact details | int  varchar  varchar  varchar  text |
| Example with data for **rescuer** table:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **rescuer\_ID** | **rescuer\_first\_name** | **rescuer\_last\_name** | **organization** | **rescuer\_contact** | | 1 | Valentin | Damaris | Kilimanjaro SAR | +255 758 222 255 | | 2 | Maria | Dumitrescu | Aconcagua National Park Visitor Center | +54 261 425 8751 | | | | | |
| **climber\_medical\_**  **info** | medical\_info\_ID (PK): Unique identifier for each medical information of a climber  climber\_ID (FK) | It shows medical information about climber’s health | * medical\_info\_ID * climber\_ID – the climber’s ID * blood\_type – blood type of the climber * allergies – any allergies the climber has * other\_medical\_note – any other useful medical information about climber’s health | int  int  enum  text  text |
| Example with data for **climber\_medical\_info** table:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **medical\_info\_ID** | **climber\_ID** | **blood\_type** | **allergies** | **other\_medical\_note** | | 1 | 1 | O+ | peanuts | type 1 diabetic: requires insulin injections | | 2 | 2 | A+ | dust | back problems: it is need ibuprofen for back pain | | | | | |
| **climb\_participant** | climb\_ID  (FK, PK )  climber\_ID (FK,PK)  . | This is a bridge table for many-to-many relationship between climber table and climb table | * climb\_ID – the climb in which the climber participated * climber\_ID – the climber who participated | int  int |
| Example with data for **climb\_participant** table:   |  |  | | --- | --- | | **climb\_id** | **climber\_id** | | 1 | 2 | | 2 | 1 | | | | | |
| **climb\_rescue** | climb\_ID  (FK,PK)  rescuer\_ID (FK,PK) | This is a table useful to track rescue during climb | * climb\_ID – the climb where the rescue happened * rescuer\_ID – the rescuer involved * rescue\_date – the date of the rescue * rescue\_details – description of the rescue operation | int  int  date  text |
| Example with data for **climb\_participant** table:   |  |  |  |  | | --- | --- | --- | --- | | **climb\_ID** | **rescuer\_ID** | **rescue\_date** | **rescue\_details** | | 3 | 1 | 2025-03-12 | fall accident– occur on the Grand Couloir - MontBlanc | | 4 | 2 | 2025-03-13 | saved from frostbite in Nanga Parbat | | | | | |

**Constraints to ensure data integrity and enforce business requirements :**

**1. climber table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **climber\_ID** | **primary Key (Unique, Not Null)** | **-** |
| **address** | **allowed: TEXT (nullable)** | **NULL** |
|  |  |  |

* **address can be nullable, as not all climbers might have an address provided.**
* **no default values for names, as they must be provided by the user or application.**

**2. climb table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **climb\_ID** | **primary Key (Unique, Not Null)** | **-** |
| **end\_date** | **allowed: DATE** | **NULL** |

* **end\_date can be nullable, especially if the climb is ongoing.**
* **dates must be valid, but no default value since the climb start and end dates should be provided.**

**3. climb\_participant table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **climb\_ID** | **foreign Key referencing climb** | **-** |
| **climber\_ID** | **foreign Key referencing climber** | **-** |

* **both climb\_ID and climber\_ID are required for identifying participants and should not be nullable. No default value is needed in this situation.**

**4. climb\_rescue table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **rescue\_date** | **allowed: DATE** | **-** |
| **rescue\_details** | **allowed: TEXT** | **NULL** |
|  |  |  |

* **rescue\_details could be nullable if some rescues do not have detailed descriptions.**
* **rescue\_date should always be provided for accurate rescue tracking.**

**5. area table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **area\_ID** | **primary key (Unique, Not Null)** | **-** |
| **area\_name** | **allowed: VARCHAR (max length 255)** | **-** |
| **country** | **allowed: VARCHAR (max length 255)** | **-** |

* **no default values because area\_name and country are essential for identifying the area.**
* **no nullable fields since the requirement don’t want allow missing data for some areas.**

**6. mountain table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **mountain\_ID** | **primary key (Unique, Not Null)** | **-** |
| **area\_ID** | **foreign key referencing area** | **-** |
| **mountain\_name** | **allowed: VARCHAR (max length 255)** | **-** |
| **height\_meters** | **allowed: INT** | **-** |
|  |  |  |

* **height\_meters can be nullable if some mountains may not have a recorded height.**
* **all other fields are NOT NULL, as they are essential for identifying the mountain.**

**7. route table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **route\_ID** | **primary key (Unique, Not Null)** | **-** |
| **mountain\_ID** | **foreign key referencing mountain** | **-** |
| **route\_name** | **allowed: VARCHAR (max length 255)** | **-** |
| **difficulty\_level** | **allowed: TEXT (nullable)** | **NULL** |
|  |  |  |

* **difficulty\_level can be nullable, especially for routes whose difficulty hasn’t been determined.**
* **the route\_name and mountain\_ID should be NOT NULL.**

**8. guide table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **guide\_ID** | **primary key (Unique, Not Null)** | **-** |
| **guide\_first\_name** | **allowed: VARCHAR (max length 255, Not Null)** |  |
| **guide\_last\_name** | **allowed: VARCHAR (max length 255, Not Null)** | **-** |
| **experience\_years** | **allowed: INT** | **3** |
| **guide\_phone\_number** | **allowed: TEXT** | **NULL** |
|  |  |  |

* **experience\_years: a positive integer representing the number of years the rescuer has been active.**
* **CHECK (experience\_years >= 3): enforces that the minimum experience is 3 years**
* **DEFAULT: if no value is provided for experience\_years, it defaults to 3, ensuring reliability in emergency cases.**
* **guide\_phone\_number can be nullable if not all guides have provided contact numbers.**

**9. climb\_note table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **note\_ID** | **primary key (Unique, Not Null)** | **-** |
| **note\_date** | **allowed: DATE** | **-** |
|  |  |  |

* **no default values are necessary for notes as they must have content.**
* **note\_date should always be recorded, so it is NOT NULL.**

**10. equipment table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **equipment\_ID** | **primary key (Unique, Not Null)** | **-** |
| **equipment\_name** | **allowed: TEXT** | **-** |
| **equipment\_type** | **allowed: TEXT** | **-** |
|  |  |  |

* **both equipment\_name and equipment\_type should be required since they are essential for identifying the equipment.**

**11. climber\_medical\_info Table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **medical\_info\_ID** | **primary key (Unique, Not Null)** | **-** |
| **blood\_type** | **ENUM ('A', 'B', 'AB', 'O')** | **-** |
| **allergies** | **allowed: TEXT** | **NULL** |
| **other\_medical\_note** | **allowed: TEXT** | **NULL** |
|  |  |  |

* **blood\_type is an ENUM with a limited set of values, which should be strictly enforced.**
* **allergies and other\_medical\_note are optional, so they can be nullable.**

**12. Rescuer Table**

| **Field** | **Allowed Values & Constraints** | **Default Value** |
| --- | --- | --- |
| **rescuer\_ID** | **primary key (Unique, Not Null)** | **-** |
|  |  |  |

* **no default values because all fields are necessary to identify the rescuer and their contact details.**

**Relationships**

**1. climb and climber (many-to-many)**

***A climb involves multiple climbers, and a climber can participate in multiple climbs.***

* **bridge table: climb\_participant is used to establish this relationship**
* **primary key**: **the combination of climb\_ID and climber\_ID is the composite primary key, ensuring that a climber can only participate once in each climb**

**2. mountain and climb (one-to-many)**

***A mountain can have multiple climbs, but each climb takes place on a specific mountain.***

* **foreign key: mountain.mountain\_ID→ climb.mountain\_ID**

**3. route and climb (one-to-many)**

***A route can be used in multiple climbs, but each climb follows a specific route.***

* **foreign key: route.route\_ID→ climb\_route\_ID**

**4. guide and climb (one-to-many)**

***A guide can lead multiple climbs over time, but each climb is led by a specific guide.***

* **foreign key: guide.guide\_ID→ climb.guide\_ID**

**5. climber and equipment (one\_to\_many)**

***One climber can use***  ***multiple pieces of equipment, but each equipment item is assigned to one climber.***

* **foreign key: climber.climber\_ID→ equipment.climber-ID**

**6. area and mountain (one-to-many)**

***An area can have multiple mountains, but a mountain is located in a specific area.***

* **foreign key: area.area\_ID →mountain.area\_ID**

**7. climber\_medical\_info and climber (one-to-one)**

***Each climber has a single medical record, and each medical record belongs to only one climber.***

* **foreign key (PK-FK): climber\_medical\_info.climber\_ID → climber.climber\_ID**

**8. climber and climb\_note (one-to-many)**

***A climber can write multiple notes, but each note belongs to a single climber.***

* **foreign key: climb\_note.climber\_ID → climber.climber\_ID**

**9. climb and climb\_note (one-to-many)**

***A climb can have multiple notes, but each note is associated with a single climb.***

* **foreign key: climb.climb\_ID→ climb\_note.climb\_ID**

**10. rescuer and climb\_rescue (one-to-many)**

***A rescuer can be involved in multiple rescues, but each rescue record is linked to one rescuer.***

* **foreign key: rescuer.rescuer\_ID→ climb\_rescue.rescuer\_ID**
* **primary key: the combination of climb\_ID and rescuer\_ID forms a composite primary key, ensuring that each rescuer is only associated once with a specific climb.**

**11. climb and climb\_rescue (one-to-many)**

***A climb can have multiple rescue records, but each rescue is tied to one climb.***

* **foreign key: climb.climb\_ID →climb\_rescue.climb\_ID**