DACH Ski Resort Advisor

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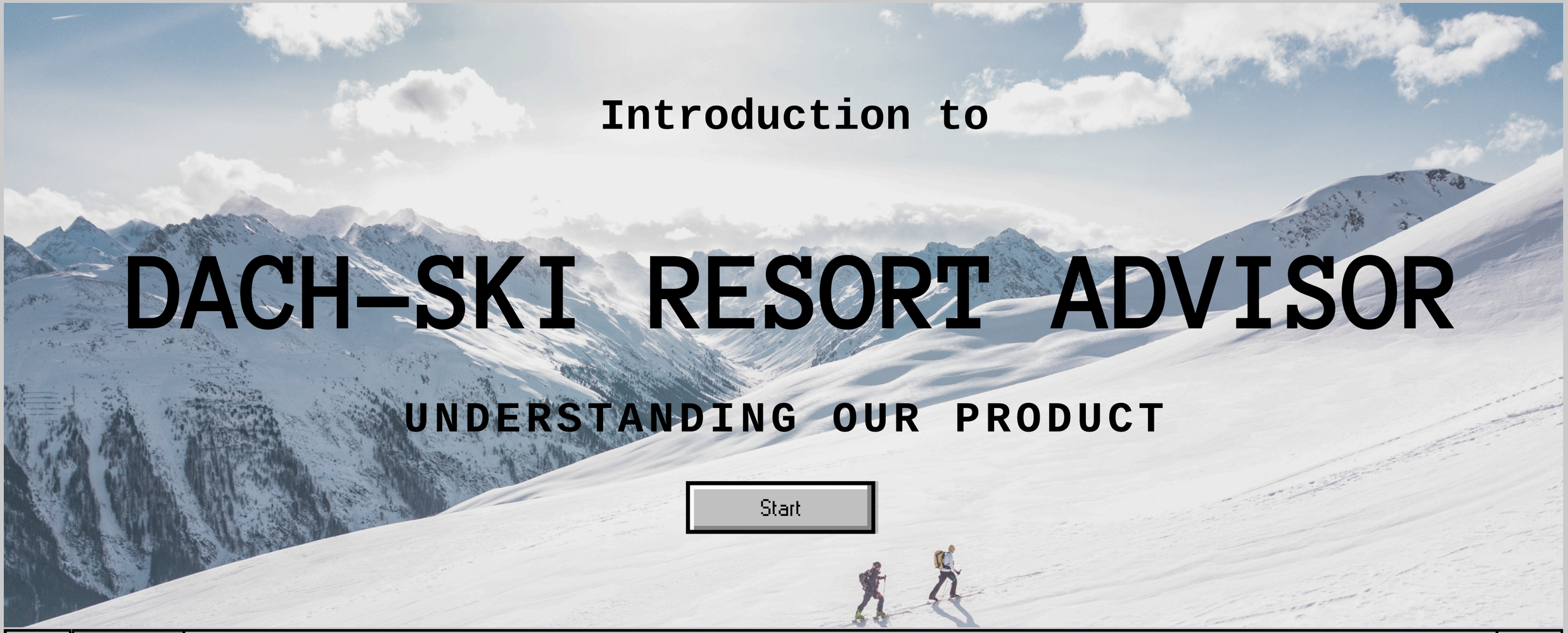
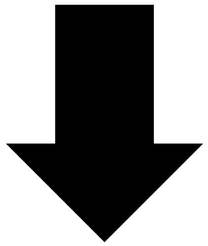


Overview and Ambition

The DACH Ski Resort Advisor is a CLI application. Its core function is to help users select the best region for Winter Sports in Germany (D), Austria (A), or Switzerland (CH



Our ambition was to create a comprehensive and insightful tool for both individual winter sports enthusiasts and ski resort managers.

Goal - **Forecasting tool** that would help both winter sports enthusiasts and Ski resort providers to forecast demand and weather patterns by leveraging decades of historical data.

Long-term winter trends and understand the potential impact of climate change on specific alpine regions.

Overview and Ambition

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Current implementation – A **simple and effective advisor** that provides a good understanding of current weather patterns and the potential winter season

Achieved approximately a third of our initial vision within the constraints of our timeline and developing skills.

The application successfully focuses on **current conditions and short-term analysis** for immediate user decision-making.

Target Audience

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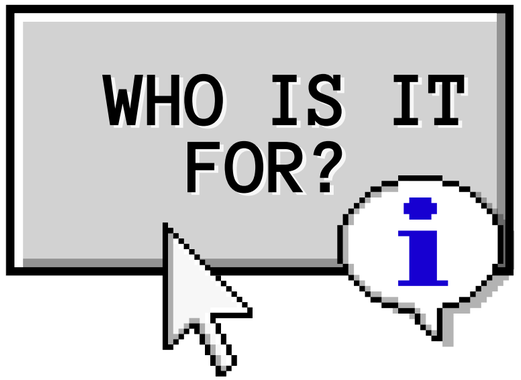

Winter sports enthusiasts — skiers and snowboarders looking for the best resort.

Travel planners and tourism agencies promoting alpine trips.

Why this audience?

These groups rely on accurate, real-time weather data to make informed decisions.

The tool empowers both individuals and organizations with actionable insights.

Core Functions

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INTERACTION

- **Interactive menu & CLI (Command line interface):** overview of every Ski region in DACH, country selection (AT,DE,CH) or region specific, with multilingual support **(EN/DE)**.
- **Subcommands**: -menu, -report, -list, -region “Example”.
- **Regional deep dives**: Region selection with historical monthly trends, PNG plot export (snow_depts/new_snow/temperature/wind/precipitation).

DATA–PIPELINE

- **Automatic data retrieval:** detects local/remote CSVs; single Supabase pull => cache in data/remote_cache/
- **Weighted scoring engine**, Preconfigured profiles (Powder, Family, Sunny, Balanced) Example: Powder = more weight on snow depending attributes.
- **Report outputs:** Annual fresh snow leaderboard, monthly overviews + ranking of regions in specific countries or whole DACH-region with optional weighting to every selected prompt.

PRETTY TABLES

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Yearly snow leaderboard (2024-10-01 – 2025-09-30)

Rank Int64	Region InlineStrings.String31	Country String	Total Snow (cm) Float64
1	Zugspitze	Germany	11322.0
2	Arosa	Switzerland	7944.0
3	Obergurgl	Austria	7163.0
4	Feldberg	Germany	6109.0
5	Saas-Fee	Switzerland	5596.0
6	St. Anton am Arlberg	Austria	4302.0
7	Garmisch-Classic	Germany	4274.0
8	Bad Gastein	Austria	3451.0
9	Ischgl	Austria	3110.0
10	Brauneck	Germany	2849.0

Top Ski Regions by Weight (2025-09)

Rank Int64	Region InlineStrings.String31	Country String	Score Float64
1	Zugspitze	Germany	76.41
2	Obergurgl	Austria	46.71
3	St. Moritz	Switzerland	46.34
4	Arosa	Switzerland	42.88
5	Saas-Fee	Switzerland	42.25
6	Davos	Switzerland	36.37
7	Brauneck	Germany	35.65
8	Zermatt	Switzerland	34.4
9	Kitzbühel	Austria	26.74
10	St. Anton am Arlberg	Austria	26.72

PRETTY TABLES

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Region InlineStrings.String31	Country String	Observations Float64	Avg Temperature (°C) Float64	Avg Precipitation (mm) Float64	Avg Wind (Beaufort) Float64	Avg Snow Depth (cm) Float64	Avg Snow_New (cm) Float64	WeightedScore Float64
Garmisch-Partenkirchen	Germany	30.0	19.87	3.36	5.07	0.0	0.0	16.435
Oberstdorf	Germany	30.0	19.35	3.12	5.13	0.0	0.0	17.575
Berchtesgaden	Germany	30.0	20.54	2.55	4.4	0.0	0.0	20.478
Feldberg	Germany	30.0	14.68	5.44	5.33	0.0	0.0	15.918
Zugspitze	Germany	30.0	4.75	5.76	6.97	22.4	18.23	76.412
Winterberg	Germany	30.0	16.38	4.28	4.53	0.0	0.0	20.172
Garmisch-Classic	Germany	30.0	13.0	3.76	5.53	0.0	0.0	22.238
Brauneck	Germany	30.0	14.66	5.58	5.43	10.4	5.4	35.65
Innsbruck	Austria	30.0	19.49	3.04	4.7	0.0	0.0	19.244
St. Anton am Arlberg	Austria	30.0	14.02	2.47	5.0	0.0	0.0	26.725
Kitzbühel	Austria	30.0	17.98	1.14	4.7	0.0	0.0	26.744
Salzburg	Austria	30.0	19.38	2.31	4.8	0.0	0.0	21.155
Bad Gastein	Austria	30.0	15.63	4.14	5.17	0.0	0.0	19.137
Ischgl	Austria	30.0	13.54	3.37	6.03	0.0	0.0	20.828
Sölden	Austria	30.0	13.97	2.72	5.27	0.0	0.0	25.042
Lech-Zürs	Austria	30.0	14.51	3.68	5.57	0.0	0.0	20.411
Saalbach-Hinterglemm	Austria	30.0	15.59	3.55	4.93	0.0	0.0	21.822
Mayrhofen	Austria	30.0	17.85	3.4	4.3	0.0	0.0	21.76
Schladming	Austria	30.0	17.76	1.77	4.73	0.0	0.0	25.058
Obergurgl	Austria	30.0	12.04	3.11	5.87	12.6	5.2	46.712
Zermatt	Switzerland	30.0	11.57	6.17	5.7	12.17	2.73	34.399
St. Moritz	Switzerland	30.0	11.05	3.79	5.57	14.83	3.23	46.336
Verbier	Switzerland	30.0	14.49	2.98	5.63	0.0	0.0	22.27
Davos	Switzerland	30.0	12.51	4.59	5.43	8.9	3.43	36.369
Interlaken	Switzerland	30.0	19.05	4.19	4.73	0.0	0.0	16.306
Arosa	Switzerland	30.0	11.64	6.24	5.93	13.03	8.0	42.876
Grindelwald	Switzerland	30.0	14.82	3.08	4.87	0.0	0.0	24.404
Saas-Fee	Switzerland	30.0	12.1	5.68	5.5	13.27	5.83	42.247
Laax	Switzerland	30.0	15.9	5.81	5.23	0.0	0.0	13.659
Crans-Montana	Switzerland	30.0	12.24	4.62	5.17	0.0	0.0	22.019
Engelberg	Switzerland	30.0	17.66	3.02	5.1	0.0	0.0	20.122

Component Diagramm

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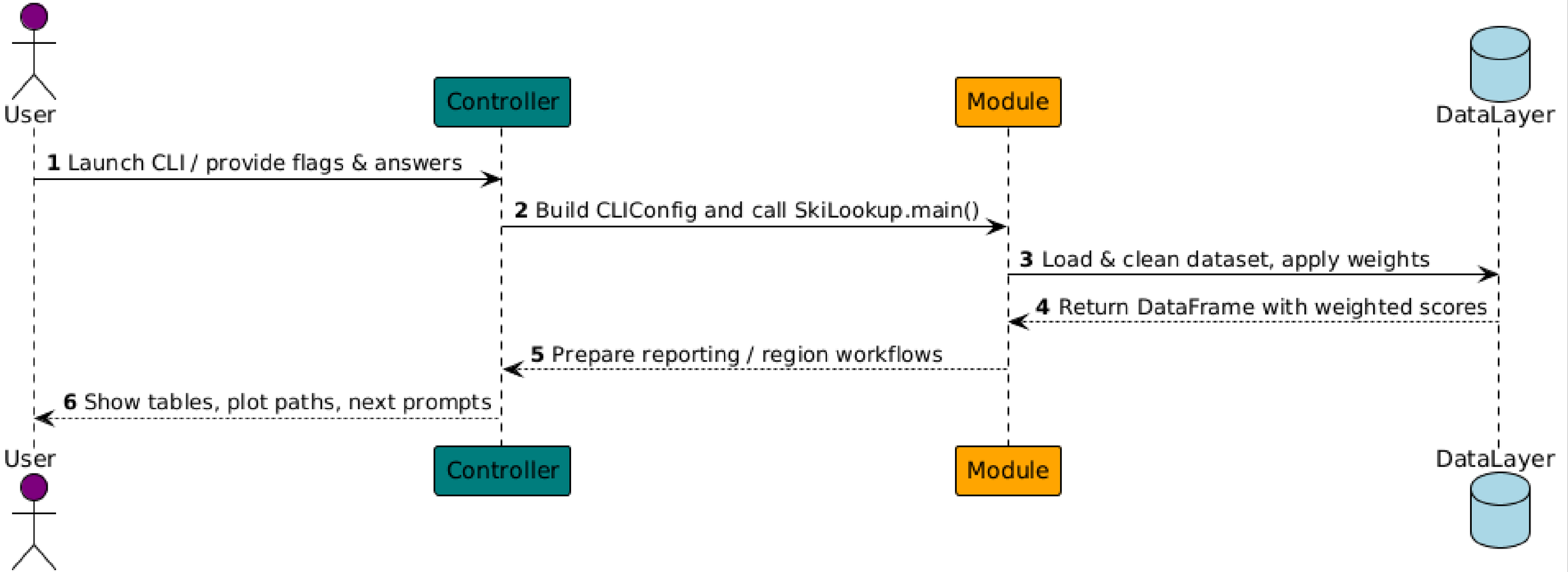

STRUCTURE

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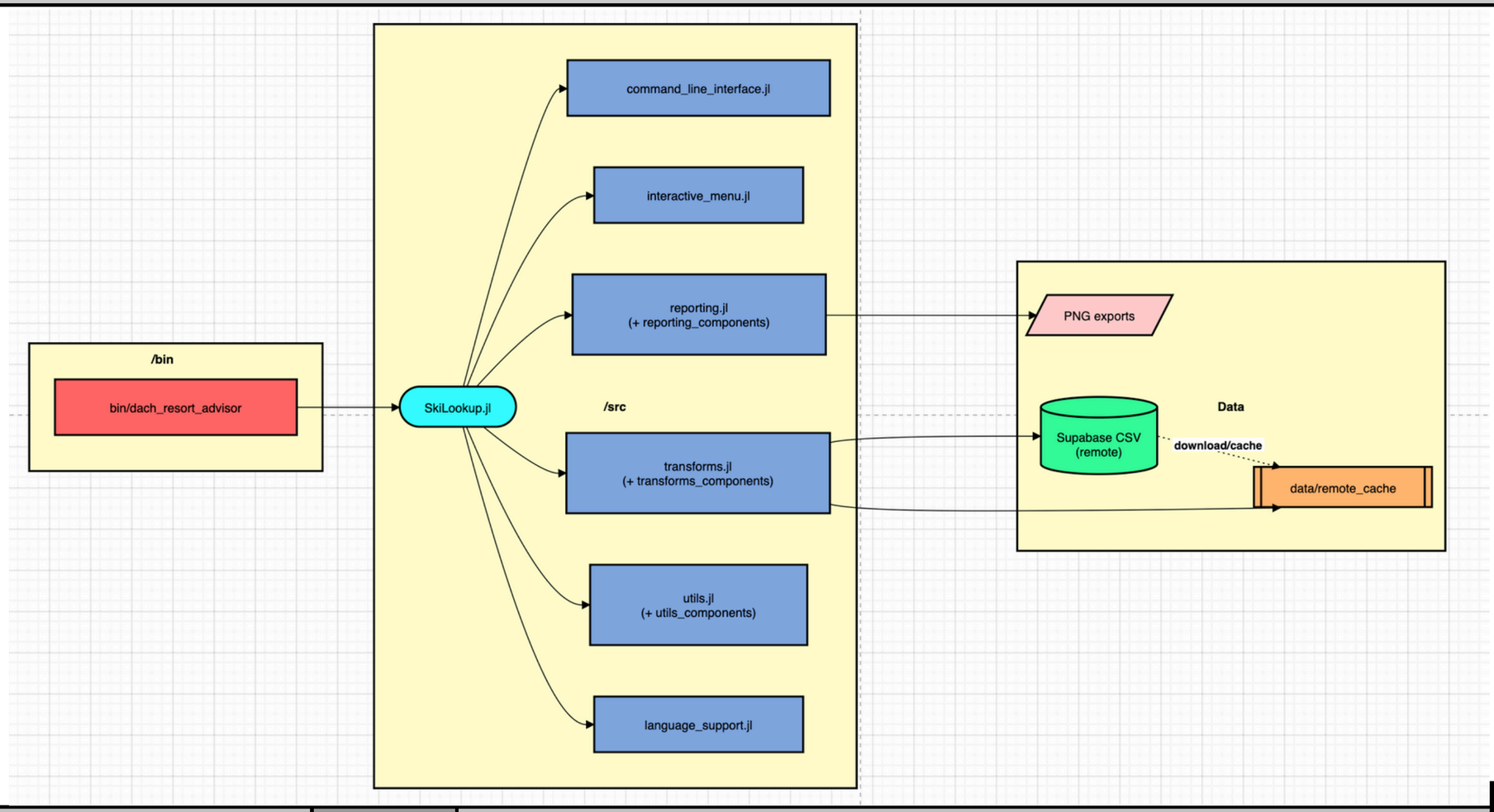

WEIGHTING - What you get

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- Personalized ski-region ranking (0–100 score)
- Based on latest month’s data
- Presets: Balanced, Powder, Family, Sunny
- View recent conditions, top snow days, monthly summary, 12-month trend

WEIGHTING, INTUITIVELY

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- **Five factors:** Snow, Depth, Temp, Rain, Wind
- Dials sum to 100 → higher = **more influence**
- Direction handled automatically (cooler/drier/calm = better)
- **Missing factor** = zero, no re-weighting
- Presets = good start; tweak anytime

HOW WE CALCULATE THE SCORE

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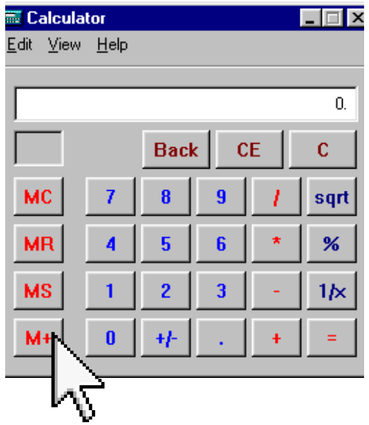
- **Uses latest month’s data**
- Normalize each factor to 0–1 scale
- Flip “lower is better” metrics
- **Multiply by weights** → sum = 0–100 score
- **Flat factor** = neutral; missing = zero
- **Trends** = region’s own monthly history (not cross-comparison)
- **Transparent, fair, consistent scoring**



PLOTS

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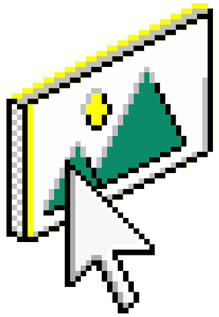

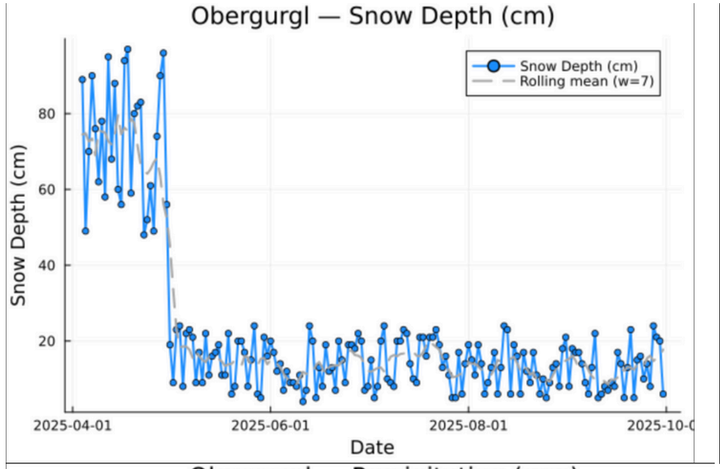

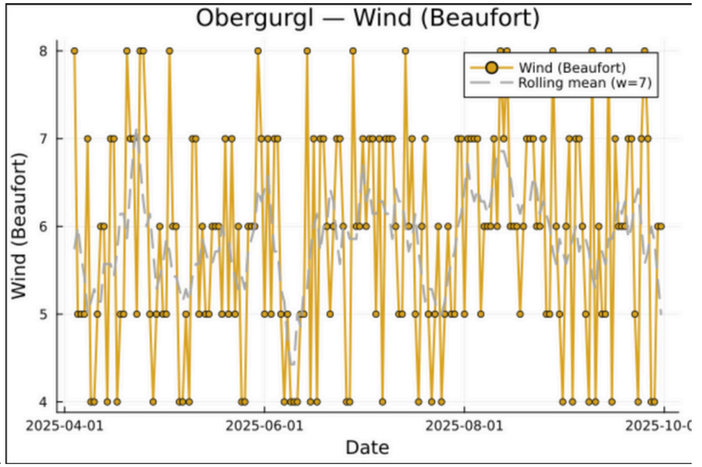

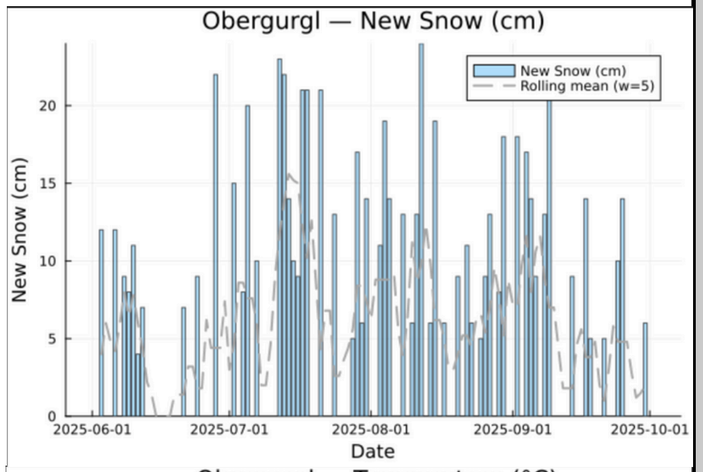

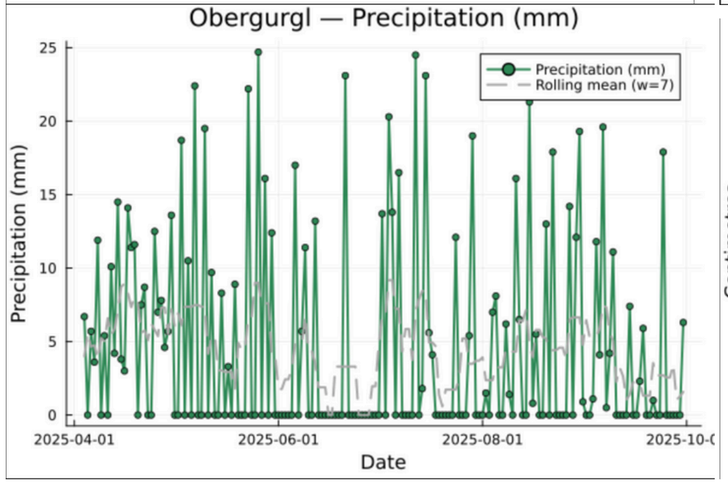

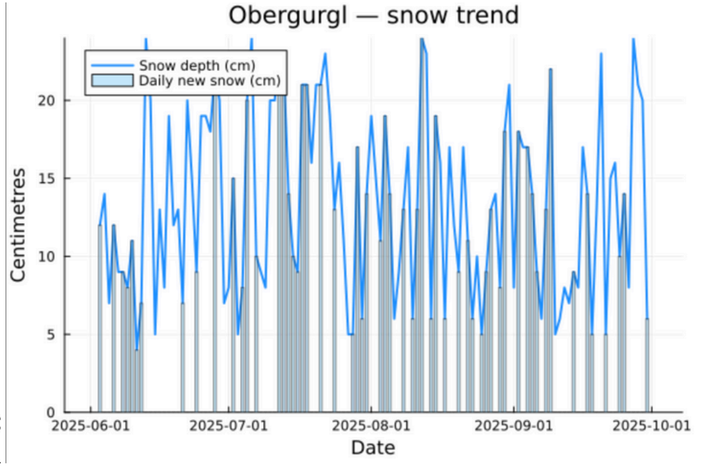

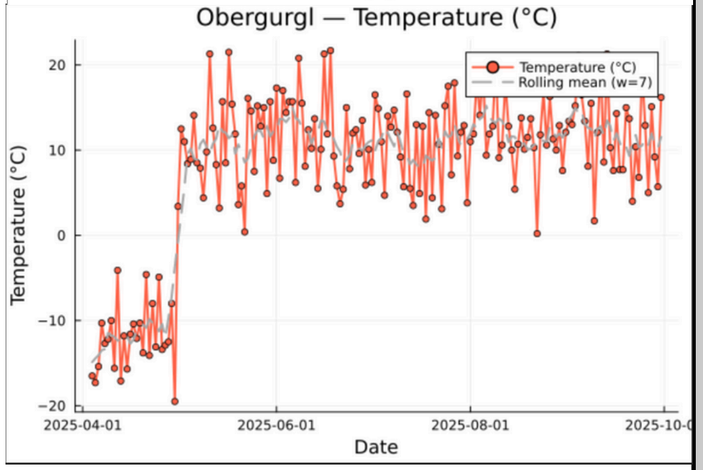

DECISION TREE

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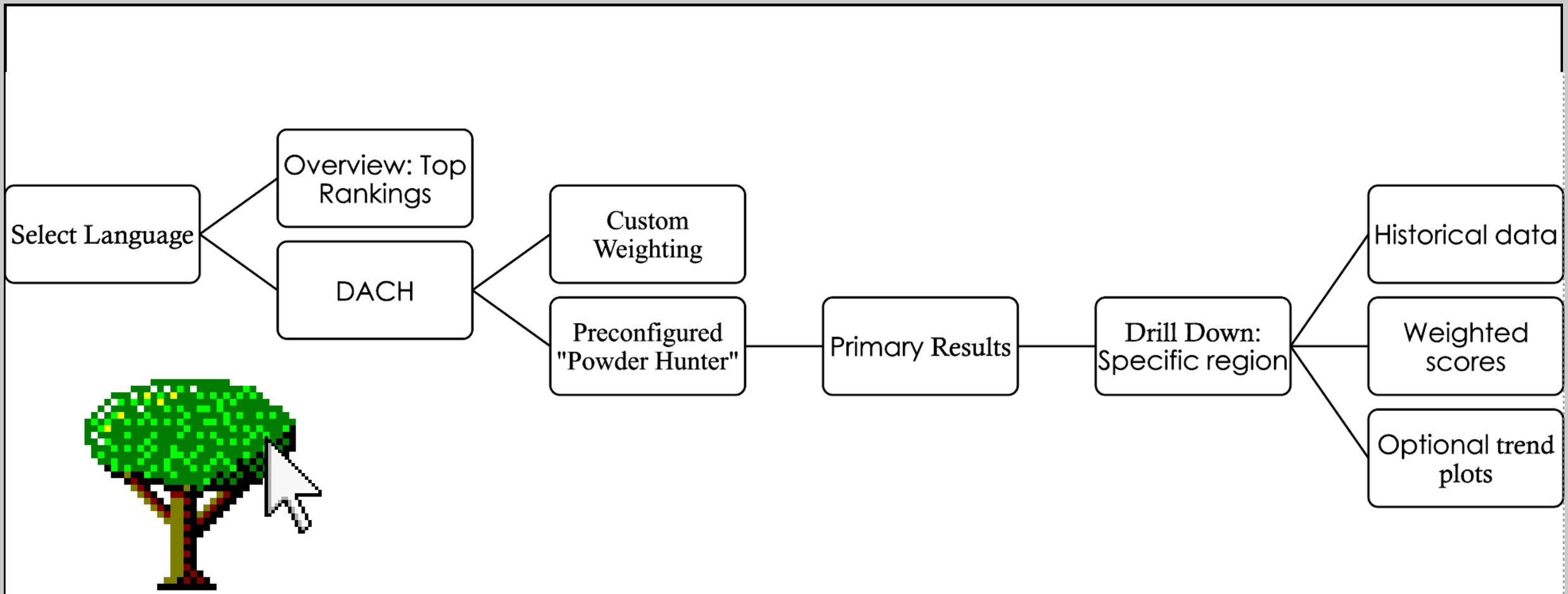

TESTING

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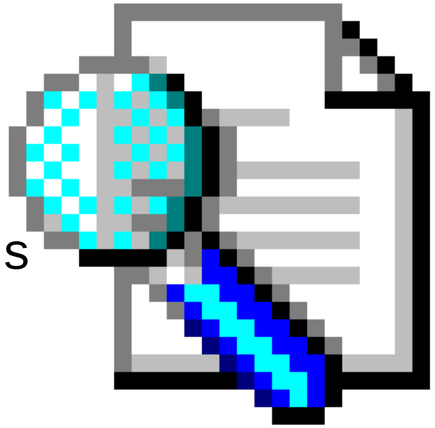

- **Numeric Data Cleaning** – Removes invalid or missing values. These tests check functions that clean up lists of numbers

- **Valid Value Collection** – Ensures only clean numeric data is used.

- **Country Canonicalization** – Standardizes country names/codes. it ensures that "DE," "DEUTSCHLAND," and "Germany" are all correctly recognized as the same country: "Germany", and CH for Switzerland.

TESTING

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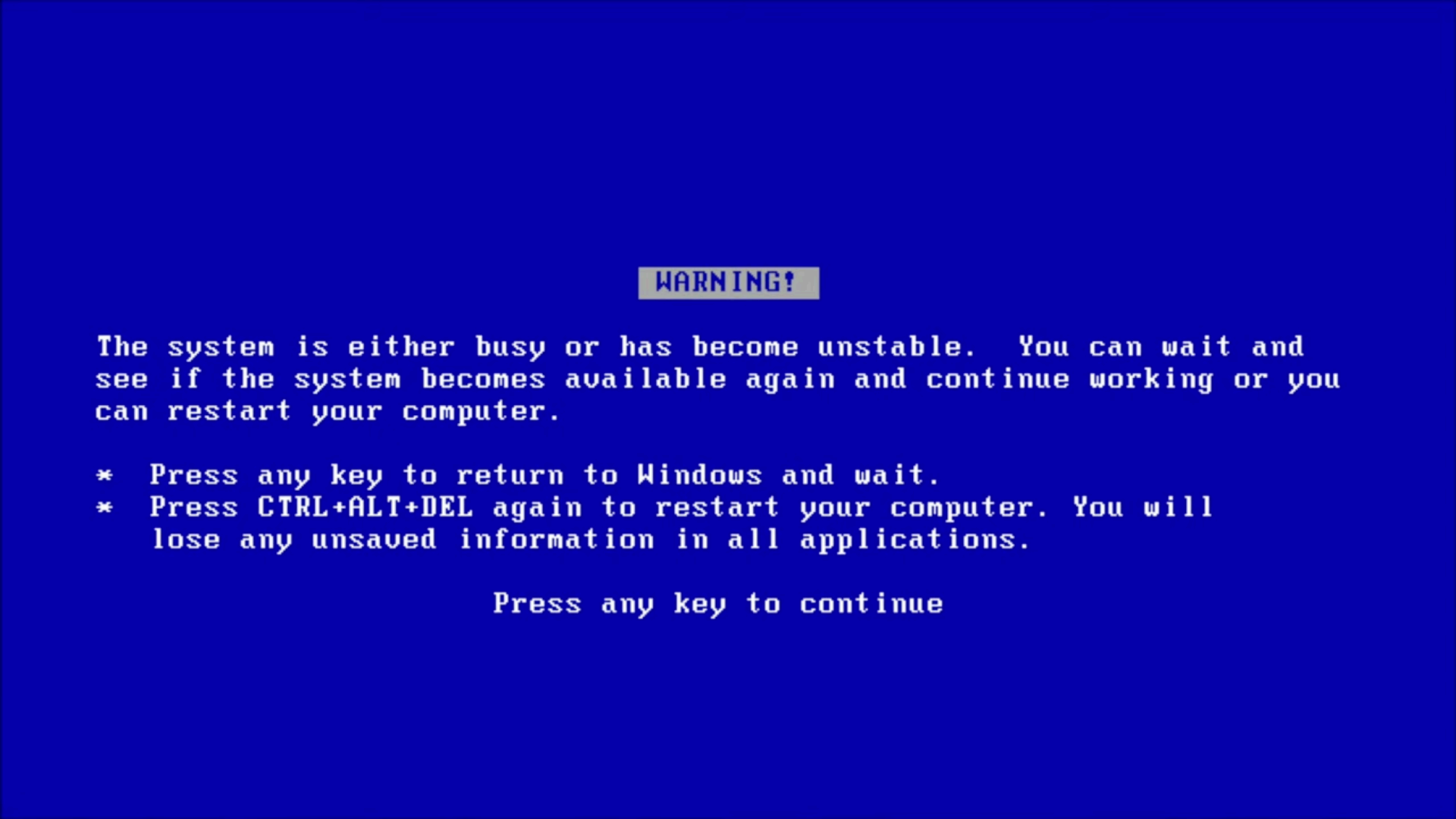
- **Weight Value Parsing –** Confirms correct handling of user inputs.These tests check helper functions that interpret user input.

- **Boolean Parsing –** Validates user responses like yes/no. Ensures that "yes" or "OFF" is correctly converted into true or false.

- **Weight Normalization –** Ensures weights sum to 100%. A user might say they care about "new snow a little" and "cold temperatures a lot."

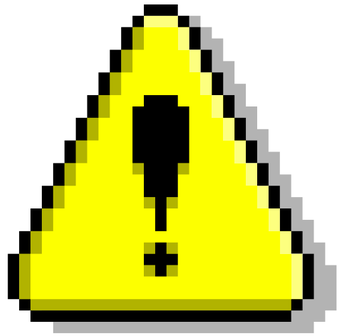

WARNING!
The system is either busy or has become unstable. You can wait and see if the system becomes available again and continue working or you can restart your computer.
* Press any key to return to Windows and wait.
* Press CTRL+ALT+DEL again to restart your computer. You will lose any unsaved information in all applications.
Press any key to continue

CHALLENGES AND ERRORS

Data Acquisition and Quality Constraints: High-quality, comprehensive data typically required licencing APIs.
Public data: Contained missing or inconsistent data points. Necessitated extensive data wrangling forcing a reduction data and variables

Time, Skill, and Scope Management: Strict timeframe, the steep learning curve for a complex forecasting tool, and a new language for the team was overly-ambitious

Team Collaboration and Design Cohesion: A lack of initial consensus on the project's final vision and data processing architecture.
Introduced inefficiencies and complicated the integration phase



User Experience (UX) Prioritization: Developer myopia.
This oversight meant the final CLI lacked sufficient context and guidance for an external end-user.

Extension and Expansion

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Expand the Dataset and Sources: Integrate additional APIs (satellite weather feeds, local webcams)

Optimizing the code so that the tool could use Big Data

- Live Weather Data Forecasts (Co-ordinates)
- Compare historical data to live data
- Integrating Pricing Data and Resort information
- Occupancy levels of resort on a percentage scale

Connect to API

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CONCLUSION