

Criterion B - Solution Overview & Design

System Architecture

The solution follows a clean separation of concerns. 'src/ui_cli.py' owns input/output and invokes the domain layer.

UML/Class Relationships (textual)

UserProfile and Exercise are independent value objects. 'datastore' depends on both through serialization, and

Data Structures

Exercises and user profiles are stored as JSON arrays. The in-memory representation favors Python lists for iteration.

Algorithmic Design

1. '_filter_exercises' removes any exercise that exceeds the client's difficulty threshold, is on the avoidance list, or is a machine exercise.
2. '_score' awards or subtracts points to reward novelty (recent set) and weekly movement balance.
3. '_pick_best' sorts candidate exercises by score and shuffles the top five to prevent deterministic outputs.
4. 'generate_plan' loops over the weekly split derived from 'SPLITS', allocates compound slots, then fills accessory slots.

Flow Summary (textual pseudocode)

```
for day_type in SPLIT[days]:
```

```
    init day + movement_counts
```

```
    while need compounds:
```

```
        choose best compound via _pick_best
```

```
        append formatted exercise, update weekly targets
```

```
    while time remaining and <8 moves:
```

```
        choose best accessory via _pick_best
```

```
        append formatted exercise, increase time + recent_set
```

Test Plan (executed manually and via unit hooks)

T1 (SC1): Create profile for "sloane" with DB + bodyweight equipment, confirm 'data/users.json' shows single entry.

T2 (SC2): Run option 2 with that user and verify CLI prints three day sections that match 'days_per_week'.

T3 (SC3): Generate two plans back-to-back, ensure exercises from plan A are absent in plan B by inspecting 'data/plans.json'.

T4 (SC4): For a profile that only has "dumbbell" equipment, confirm no machine-only exercises appear and that only dumbbell exercises appear.

T5 (SC5): Inspect console output to ensure every exercise shows movement + 'sets x reps' string computed from movement and reps.

T6 (SC6): After generating, open 'data/plans.json' and verify new plan appended with correct 'user_id' and day_type.

These design assets were reviewed with the client on 8 February and approved as the blueprint for development.