

# Technical Design Document 02: Ethical Systems & Retention

Version: 1.0.0

Source Material: Consolidated from "Ethical Game Design Patterns" and "Strategy Game Loop Analysis".

## 1. Philosophy: Accumulation vs. Depletion

We reject "Depletion Models" (e.g., base decay, starvation mechanics) that punish players for offline time. We adopt "Accumulation Models" where offline time generates potential value.

## 2. Retention Mechanic: The "Rested" System

This system unifies the concepts of "Rested XP" (Doc 2) and "Chronos Points" (Doc 4).

### 2.1 The Math of Time Banking

- **Accumulation Rate:** Players earn 1 "Time Unit" (TU) for every minute offline.
- **Cap:** The pool caps at 72 hours (3 days). This specifically targets the "Weekend Warrior" demographic, allowing them to play efficiently without daily login pressure.

### 2.2 Implementation (Shared Schema)

```
// shared/schemas/PlayerRetention.ts
import { Schema, type } from "@colyseus/schema";

export class PlayerRetention extends Schema {
    @type("number") lastLogoutTime: number;
    @type("number") restedPool: number; // 0.0 to 100.0 (Percentage of Cap)

    // Configuration
    private static MAX_POOL_HOURS = 72;
    private static GAIN_PER_HOUR = 100 / PlayerRetention.MAX_POOL_HOURS;

    /**
     * Called on Server Join.
     * Calculates offline drift and awards Rested Potential.
     */
    calculateOfflineGain() {
        const now = Date.now();
        const hoursOffline = (now - this.lastLogoutTime) / (1000 * 60 * 60);
    }
}
```

```

        if (hoursOffline > 0.25) { // Minimum 15 min break required
            const gain = hoursOffline * PlayerRetention.GAIN_PER_HOUR;
            this.restedPool = Math.min(100, this.restedPool + gain);
        }

        this.lastLogoutTime = now;
    }
}

```

### 3. Ethical RNG: The Shuffle Bag

To ensure fairness and transparency, we reject pure `Math.random()` for critical gameplay outcomes (combat hits, loot drops). We implement a "Shuffle Bag" (Tetris-style RNG).

#### 3.1 Algorithm

1. **Input:** A probability (e.g., 25% Critical Hit).
2. **Bag Construction:** Create a bag of size \$N\$ (e.g., 4). Fill with 1 "Success" and 3 "Failures".
3. **Shuffle:** Randomize order.
4. **Draw:** Draw without replacement until empty, then refill.

#### 3.2 Benefits

- **Guaranteed Rates:** 25% is exactly 25% over 4 attempts.
- **Streak Mitigation:** Prevents "bad beat" streaks that cause churn.

### 4. Anti-Pattern Constraints

- **No Daily Streaks:** Login bonuses are based on total playtime or random intervals, never consecutive days.
- **No Pay-to-Skip:** Players cannot buy "Time Units" or speed-ups. Monetization is strictly cosmetic or analytic (e.g., stats dashboards).