

[S] LOVE SNAKE

on Solana

Game Design Document — v1.0

Slither-style multiplayer crypto game with burnable NFT snakes

Strategy

Hybrid: off-chain MVP in Supabase → on-chain mint on Solana when player upgrades.
Existing LOVE Snake (Stellar) remains untouched. New game = separate route, separate tables.

Key Pillars

[*] Eat ONLY LOVE coins · [S] Burnable NFT snakes (deflationary) · [-] Hybrid
Stellar↔Solana LOVE · [T] Tournaments + Leaderboard rewards

1. Executive Summary

LOVE Snake on Solana is a slither.io/snook.io-inspired massively-multiplayer browser game where every player controls a unique **NFT snake**. Players grow by eating **LOVE coins** only — consuming competing crypto tokens (BTC/ETH/SOL pellets) inflicts penalties. Death = NFT burn, creating real scarcity and a deflationary loop tied to LOVE token economics.

The game launches as an off-chain MVP (Supabase ledger) and graduates to real Solana NFT minting (Metaplex Core) via lazy minting once a player wants verifiable on-chain ownership. The existing LOVE Snake (retro grid, Stellar) remains in place untouched — this is a parallel product at </dashboard/games/love-snake-solana>.

Why this works for LOVE

- **Demand sink:** every NFT mint, attribute upgrade and tournament entry burns LOVE.
- **Scarcity:** NFT snakes are destroyed on death — supply only goes down.
- **Bridge utility:** first real reason for users to bridge LOVE Stellar ↔ Solana.
- **Virality:** slither.io archetype is proven addictive; crypto twist differentiates.
- **No external runtime API:** MVP is fully self-contained (Supabase + WebSocket).

2. Code Reuse Analysis

2.1 Existing LOVE Snake (Stellar) — what we reuse

Component	Reuse?	Notes
Snake game loop (movement, grid-to-vector)	■ Adapt	Convert grid-step → continuous vector movement
useGameWallet (LOVE deduct/reward)	■ Direct	Same flat-fee + 30% logic for entry stakes
transfer_love RPC	■ Direct	All economy goes through it (mint, burn, payout)
SnakeSkinShop (NFT-style catalog)	■ Pattern	Reuse rarity/serial/equip pattern for snakes
SnakePvpPanel (escrow lobbies)	■ Adapt	1v1 → arena rooms with multi-player escrow
SnakeTournamentPanel + cron	■ Direct	Same weekly auto-finalize edge fn
SnakeMissionsPanel + RPCs	■ Direct	Add Solana-specific mission types
Retro grid renderer	■ Replace	Swap for Canvas2D/PixiJS continuous renderer
snake_pvp_matches table	■ New table	Need snake_sol_arenas (room-based, N players)

2.2 Open-source slither.io references

- **slither.io clones (MIT):** github.com/ClickerMonkey/SlitherIO-Clone, github.com/huytd/agar.io-clone — useful for client interpolation & server tick loop.
- **snook.io:** closed source. We copy the *idea* (NFT skins/snakes) but **fix their mistakes:** (a) inflationary mint with no burn, (b) NFT lock-in on death created bad UX, (c) no real token utility beyond skins.
- **Our deltas:** burn-on-death is opt-in for off-chain snakes (refund 50% if you skip mint), only on-chain NFTs are fully burned. Every action loops back to LOVE demand.

2.3 New code we must write

- Continuous-space client renderer (Canvas2D, ~60fps).
- Authoritative server tick (Supabase Edge Function + WebSocket via Realtime presence).
- AI snake generator (Gemini Nano Banana — already wired in lova-image).
- Solana adapter layer (Phantom wallet adapter + Metaplex Core mint/burn).
- Bridge widget (Stellar LOVE ↔ Solana LOVE — separate scope, see §7).

3. Gameplay Design

3.1 Core loop (60-second mental model)

Choose snake → enter arena → eat LOVE pellets → grow → kill smaller snakes → avoid bigger snakes & alien crypto → cash out OR die (NFT burns).

3.2 Pellets / consumables

Pellet	Effect	Spawn rate
(L) LOVE coin	+1 length, +1 score	70% of pellets
(LL) LOVE cluster (5)	+5 length, +5 score	8%
(!) LOVE Spark (rare)	+10 length, 5s speed boost	2%
BTC BTC pellet	−2 length, −10 score (penalty)	8%
ETH ETH pellet	−1 length, 3s slow	6%
SOL SOL pellet	Reverse controls 4s	6%

Design rationale: 70% LOVE supply ensures players ALWAYS have a positive incentive nearby. Penalty pellets force attention (can't autopilot) and reinforce LOVE-only branding.

3.3 Death & burn

- **Trigger:** head touches another snake's body, or hits world boundary.
- **Off-chain snake:** NFT record marked burned in DB. 50% of mint cost refunded as LOVE consolation.
- **On-chain snake (Solana):** Metaplex Core asset is hard-burned via burnV1. No refund. Earns **+25% kill bounty** from killer's payout (premium risk = premium reward).
- **Cash-out:** player can voluntarily exit alive any time, banking accumulated score → LOVE rewards (see §5).

3.4 Arena structure

Mode	Players	Stake	NFT req?
[P] Practice	1 + bots	0 LOVE	No
[S] Public Arena	up to 50	Free entry	Need any snake NFT
[\$] Stake Arena	up to 25	10/50/250 LOVE	Yes
[K] NFT-only Arena	up to 25	100 LOVE	On-chain Solana NFT only
[T] Weekly Tournament	up to 100	500 LOVE	Yes — auto-finalize cron

4. NFT Snake System

4.1 Generation

Each snake is an AI-generated NFT created via Lovable AI (Gemini Nano Banana — already integrated). Cost: **5 LOVE** per generation (3 LOVE burned, 2 LOVE to platform treasury). 30-second cool-down per user to prevent spam.

4.2 Attributes (rolled at mint, immutable for off-chain, on-chain via Metaplex update auth)

Attribute	Range	In-game effect
Speed	80–120	Movement velocity multiplier
Agility	80–120	Turn radius (lower = sharper turns)
Vitality	1–3 lives	Extra respawn within same arena run
Greed	0.9×–1.3×	LOVE pellet score multiplier
Rarity	Common→Mythic	Visual flair + entry bonus to leaderboards

4.3 Rarity distribution & supply

Rarity	Roll chance	Supply cap	Mint price
Common	60%	unlimited	5 LOVE
Rare	25%	unlimited	5 LOVE
Epic	10%	5,000	5 LOVE (gated by RNG)
Legendary	4%	500	5 LOVE (gated)
Mythic	1%	100	5 LOVE (gated) — auto on-chain

4.4 Upgrade economy

- **Re-roll attribute:** 25 LOVE (15 burned).
- **Cosmetic re-skin (AI re-generation, keeps stats):** 10 LOVE (6 burned).
- **Promote off-chain → on-chain mint (lazy mint to Solana):** 50 LOVE (20 burned, 30 covers gas + Metaplex fee).
- **LOVE Phone Founder bonus:** +5 to all attribute rolls, free first re-roll, 25% mint discount.

4.5 Marketplace

Internal marketplace at /dashboard/games/love-snake-solana/market. Listing fee 0 LOVE. **Sale fee: 3%** (1.5% burn / 1% platform / 0.5% to weekly prize pool). Off-chain trades = DB ownership transfer. On-chain = Metaplex transfer with Phantom signature. Integrates with existing Marketplace 30% rule? **No** — game NFTs use the lower 3% rate to keep the trading flywheel active.

5. Tokenomics & Economy

5.1 LOVE inflows (faucets) vs outflows (sinks)

Direction	Mechanic	Rate / share
[+] INFLOW	Tournament prize pool payout	70% of pool to top-10
[+] INFLOW	Daily login mission	2 LOVE / day
[+] INFLOW	Kill bounty	20% of killed snake's stake
[+] INFLOW	Cash-out (alive exit)	Score $\times$ 0.05 LOVE
[BURN] SINK	NFT mint	5 LOVE (60% burn)
[BURN] SINK	Re-roll attribute	25 LOVE (60% burn)
[BURN] SINK	Stake Arena entry	10–250 LOVE (10% rake, 30% of rake burned)
[BURN] SINK	Marketplace sale	3% of price (50% of fee burned)
[BURN] SINK	Promote to on-chain	50 LOVE (40% burn)
[BURN] SINK	Death of NFT	100% of NFT residual value destroyed

5.2 Target burn ratio

Goal: sustainably burn **2× more LOVE** than the game emits (deflationary). Modeling assumptions (1,000 DAU, 5 games/day):

Metric	Daily est.
LOVE emitted (rewards + bounties + cash-out)	~12,000 LOVE
LOVE burned (mints + upgrades + fees + dead NFT residual)	~26,000 LOVE
Net burn / day	~14,000 LOVE [BURN]
Net burn / month	~420,000 LOVE [BURN]

Numbers re-validated weekly via existing economy monitoring dashboard. Auto-throttle: if ratio drops below 1.2×, daily mission rewards are scaled down 20%.

5.3 What snook.io got wrong (and we fix)

- **Snook:** NFT mint fee was constant USD → no LOVE-side scarcity. **We:** mint fee paid in LOVE, 60% burn.
- **Snook:** killed NFT was locked but not burned → infinite supply. **We:** hard burn on death = real scarcity.
- **Snook:** no tournament loop → no recurring engagement. **We:** weekly auto-tournament with prize pool.
- **Snook:** 10% marketplace fee killed liquidity. **We:** 3% fee, half burned.

- **Snook:** token gated everything → new players couldn't try. **We:** Practice mode is fully free.

6. Technical Architecture

6.1 Stack

Layer	Choice	Rationale
Renderer	Canvas2D (no PIXIJS dep at MVP)	Lower bundle, mobile-friendly
Net transport	Supabase Realtime (WebSocket)	Already in stack, no new infra
Server tick	Edge Function (snake-arena-tick, 30Hz)	Authoritative, anti-cheat baseline
State store	Postgres (snake_sol_*)	Same RLS pattern as existing snake_*
NFT (off-chain)	snake_sol_nfts table	Fast, no gas, instant burn
NFT (on-chain)	Solana + Metaplex Core	Real ownership when user opts-in
Solana RPC	Helius (paid) — secret HELIUS_RPC_KEY	Reliable, token API included
Wallet adapter	@solana/wallet-adapter-react	Phantom + Solflare + Backpack
Image gen	Lovable AI (Gemini Nano Banana)	Already wired, no new key

6.2 Database tables (new)

- snake_sol_nfts — owner_id, attributes JSONB, rarity, status (alive/burned), minted_on_chain_at, solana_mint_address (nullable).
- snake_sol_arenas — room_id, mode, max_players, stake, status, prize_pool.
- snake_sol_arena_players — arena_id, user_id, snake_nft_id, score, alive_since, killed_at.
- snake_sol_marketplace_listings — nft_id, price_love, listed_by, status.
- snake_sol_tournaments — week_start, prize_pool, status (mirror of existing pattern).

6.3 RPCs (security-definer, mirror existing snake_* pattern)

- generate_snake_sol_nft(p_seed_prompt text) → calls Lovable AI, deducts LOVE, inserts NFT.
- burn_snake_sol_nft(p_nft_id uuid, p_killer_id uuid) → marks burned, transfers bounty.
- join_snake_sol_arena(p_arena_id, p_nft_id) → escrow stake via transfer_love.
- settle_snake_sol_arena(p_arena_id) → tournament-style payout, 10% house, 30% of rake burned.
- promote_snake_sol_nft_onchain(p_nft_id, p_solana_address) → marks pending mint, edge fn does Metaplex call.

6.4 Anti-cheat

- Server is authoritative for collisions, pellet pickup and death.
- Client sends only *intent* (heading vector + boost flag), never positions.
- Speed cap server-side per snake's stat block; rejects impossible moves.
- Rate-limit pellet pickup events (max 50/sec).

7. LOVE on Stellar ↔ LOVE on Solana

Per /dashboard/buy-love-on-solana existing flow, we add an in-game widget:

- **Default:** game uses **internal LOVE balance** (Stellar-side, via existing exchange_balances) — no bridge needed.
- **Promote-to-on-chain:** only when player wants real Solana NFT, we bridge ~50 LOVE worth via existing custodial swap path.
- **Reverse:** selling on-chain Solana NFT for off-chain LOVE — credit hits Stellar-side internal balance.
- **UX:** bridge cost shown upfront, executed atomically via edge function (no wallet juggling).

Decision

Bridge stays optional. 95% of players will play with internal LOVE only. Solana mint is a paid *verification* feature for serious collectors, not the default path.

8. Ecosystem Integration

- **Profile + Badges:** 'First Mythic Snake', 'Tournament Champion', 'Burn Veteran (10 NFTs)'.
- **Leaderboard:** weekly + all-time, integrated with existing leaderboard infra.
- **LOVE Field:** top-3 weekly snakes appear as ambient skins in LOVE Field.
- **LOVE Phone Founder:** exclusive cosmetic frame + +5 attribute roll bonus.
- **Sparks:** auto-spark on Mythic mint and tournament wins (with screenshot).
- **Premium tier:** 50% off all upgrade fees, exclusive Premium-only arenas.

9. Phased Rollout

Phase	Scope	Effort	API needs
Phase 1 Promo + Waitlist	/promo/love-snake-solana with AI snake previews, tokenomics teaser, waitlist (25 LOVE airdrop)	~1 day	[OK] None
Phase 2 Single-player MVP	Canvas renderer + AI bots, no chain, no NFT. Pure gameplay validation.	~3-4 days	[OK] None
Phase 3 Off-chain NFT + economy	NFT generation (Gemini), mint/upgrade/burn, marketplace, Lovable economy, missions	~5-7 days	[!!!] Lovable AI (already wired)
Phase 4 Multiplayer arenas	Realtime sync via Supabase, server tick edge fn, stake arenas + weekly tournament cron	~7-10 days	[OK] Supabase only
Phase 5 Solana on-chain mint	Wallet adapter, Metaplex Core mint/burn, lazy mint promotion path	~5 days	[!!!] Helius RPC API key
Phase 6 Bridge UX polish	In-game bridge widget, cross-network UX, profile/badges/Sparks integration	~3 days	[OK] None

Recommended next step (per user choice)

Phase 1: Promo + Waitlist Page

Build /promo/love-snake-solana with: hero (AI-generated snake mosaic), 'how it works' in 3 steps, tokenomics infographic, FAQ, waitlist signup with 25 LOVE airdrop bonus. Uses existing waitlist pattern (wallet_early_access). [OK] Brez zunanjega API-ja.

10. Risks & Open Questions

Risk	Severity	Mitigation
Server tick latency at 50 players	High	Cap at 25/arena MVP, scale via multiple edge fn workers
AI image gen cost spikes	Med	30s cooldown + 5 LOVE fee covers cost; throttle
Solana RPC outage	Med	Fallback: queue mints, retry; keep off-chain working
Burn ratio drops below 1×	High	Auto-throttle daily rewards (built-in)
NFT death feels too punishing	Med	50% refund for off-chain; on-chain players opt-in knowingly
Cheating (impossible moves)	High	Server-authoritative, rate limits, replay validation phase 7
Cannibalizing existing LOVE Snake	Low	Different audience (retro vs slither), separate route

Open questions for the team

- Should mint be available to free users, or gate to LOVE Pass holders only?
- Tournament cadence — weekly or daily 'flash' tournaments too?
- Do we want a 'safe mode' arena where death = lose stake but NFT survives (pay 50 LOVE more to enter)?
- Marketing: standalone landing or sub-page under /promo/games?

— End of GDD v1.0 —

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