TASKS.md

Date initialized: 2026-02-16
Last updated: 2026-02-18 (FR-22 closed + denied-fallback hardening + accessibility PDF artifact sync)
Cadence: 1-hour deliverables with hard deadlines
Source: `docs/Requirements.md` (markdown mirror) + `docs/G4 Week 1 - CollabBoard-requirements.pdf`

Priority Lanes
- Lane A: MVP hard gate (must pass first)
- Lane B: AI board agent
- Lane C: Submission artifacts and documentation
- Lane D: Operations (Linear, transcripts, OpenClaw readiness)
- Lane E: Post-MVP differentiators and collaboration depth
- Lane F: Accessibility and compliance evidence

Hourly Execution Plan

ID	Deadline (CT)	Task	Lane	Owner	Status
T-001	2026-02-16 14:30	Finalize `PRESEARCH.md` from PDF rubric	C	Max	Done
T-002	2026-02-16 15:00	Finalize `PRD.md`, `MVP.md`, `DECISIONS.md`	C	Max	Done
T-003	2026-02-16 15:30	Break implementation work into Linear tickets	D	Max	Done
T-004	2026-02-16 16:30	Initialize app scaffold (web + backend functions)	A	Max	Done
T-005	2026-02-16 17:30	Implement authentication flow	A	Max	Done
T-006	2026-02-16 18:30	Implement presence and multiplayer cursors	A	Max	Done
T-007	2026-02-16 19:30	Implement object create/move/edit + realtime sync	A	Max	Done
T-008	2026-02-16 20:30	Implement infinite pan/zoom + shape support	A	Max	Done
T-009	2026-02-16 21:30	Run 2-browser and refresh/disconnect tests	A	Max	Done
T-010	2026-02-17 09:30	Deploy MVP public URL + verify hard gate checklist	A	Max	Done
T-011	2026-02-17 12:00	Add AI command dispatcher and 3 basic commands	B	Max	Done
T-012	2026-02-18 12:00	Expand to 6+ commands including layout + complex	B	Max	Done
T-013	2026-02-19 18:00	Add automated tests for core collaboration flows	A	Max	Done
T-014	2026-02-20 18:00	Prepare early submission package (video + docs)	C	Max	Done
T-015	2026-02-22 20:00	Final polish, cost analysis, social post assets	C	Max	Done
T-016	2026-02-22 22:00	Final submission freeze and upload	C	Max	Done
T-017	2026-02-17 14:00	Implement and validate `BoardObject` + `CursorPresence` schemas	A	Max	Done
T-018	2026-02-17 16:00	Implement LWW/versioned write and optimistic reconcile policy	A	Max	Done
T-019	2026-02-18 14:00	Add AI idempotency records and per-board FIFO command ordering	B	Max	Done
T-020	2026-02-18 17:00	Enable Firestore offline persistence + RTDB `onDisconnect()`	A	Max	Done
T-021	2026-02-19 12:00	Add Playwright multi-context e2e for sync + concurrent AI commands	A	Max	Done

T-022	2026-02-19 16:00	Add Konva stage manager optimization for high object count	A	Max	Done
T-023	2026-02-22 19:00	Run manual OAuth browser throttle/reconnect demo and capture proof	A	Max	Done
T-024	2026-02-22 19:30	Add demo video URL + social post URL to `SUBMISSION_PACKAGE.md`	C	Max	Done
T-025	2026-02-22 20:30	Final QA sweep of all submission PDFs and links	C	Max	Done
T-026	2026-02-17 17:30	Add OSS build-vs-buy scorecard and post-MVP roadmap to `PRESEARCH.md`	C	Max	Done
T-027	2026-02-23 12:00	Run 1-2 day spike: Yjs + Hocuspocus + current object schema mapping	E	Max	Done
T-028	2026-02-23 18:00	Implement connectors/arrows with snapping to object anchors	E	Max	Done
T-029	2026-02-24 14:00	Implement frames with titled regions and drag-contained objects	E	Max	Done
T-030	2026-02-24 18:00	Implement undo/redo command history for create/move/edit/delete	E	Max	Done
T-031	2026-02-25 14:00	Add comments and @mentions on board objects	E	Max	Done
T-032	2026-02-25 18:00	Add voting mode (dot voting) and facilitation timer	E	Max	Done
T-033	2026-02-26 14:00	AI: smart layout analysis command (`organize this board`)	B	Max	Done
T-034	2026-02-26 18:00	AI: synthesize sticky notes into grouped themes	B	Max	Done
T-035	2026-02-27 14:00	Add screenshot-to-stickies (OCR ingest pipeline)	E	Max	Done
T-036	2026-02-27 18:00	Add export to image/PDF (full board and selection)	E	Max	Done
T-038	2026-02-28 18:00	Add activity timeline (event replay baseline)	E	Max	Done
T-039	2026-03-01 14:00	Add mini-map navigation and keyboard shortcuts reference panel	E	Max	Done
T-040	2026-02-17 20:00	Add Yjs pilot mirror scaffold behind env flag (`VITE_SYNC_BACKEND`)	E	Max	Done
T-041	2026-02-17 21:00	Optimize laptop-height layout (compact chrome, non-scrolling board shell, tabbed side navigation)	E	Max	Done
T-042	2026-02-17 21:30	Refresh Playwright assertions for modern login/header and add laptop viewport fit regression test	A	Max	Done
T-043	2026-02-17 22:00	Add explicit icon tooltips and convert AI assistant into open/minimize chat widget	E	Max	Done
T-044	2026-02-17 22:20	Fix presence status colors (green online/orange away) from heartbeat + add e2e regression	A	Max	Done
T-045	2026-02-17 22:45	Make shapes editable (inline text + shape type switch for rectangle/circle/diamond/triangle)	E	Max	Done
T-046	2026-02-17 23:00	Add UI AI-command e2e (chat widget submit -> board object created)	A	Max	Done
T-047	2026-02-17 23:20	Add E2E coverage for delete flows (toolbar/Delete/Backspace + disabled state)	A	Max	Done
T-048	2026-02-17 23:35	Add E2E coverage for sticky/shape color changes and palette visibility	A	Max	Done
T-049	2026-02-17 23:45	Add AI error-path E2E coverage (unsupported/malformed/recovery)	A	Max	Done
T-051	2026-02-18 00:05	Extract shared Firestore E2E helper and expand AI UI color-command coverage	A	Max	Done
T-052	2026-02-18 00:20	Remove standalone shape-create toolbar actions; allow sticky note shape + color customization with AI tab defaulting on right sidebar	E	Max	Done
T-053	2026-02-18 00:35	Route AI "add shape" commands to shaped sticky notes to match UI shape-removal decision	B	Max	Done
T-054	2026-02-18 00:55	Add E2E sticky drag persistence test to guarantee s

ticky remains at released position after drag end | A | Max | Done |
T-055	2026-02-18 01:10	Add non-Playwright unit test suite for drag write ordering (single-user late packets + multi-user concurrent drags)	A	Max	Done
T-056	2026-02-18 11:30	Add sticky drop-in bounce animation for newly created sticky notes	E	Max	Done
T-057	2026-02-18 11:45	Add vote confetti burst particles when casting sticky-note votes	E	Max	Done
T-058	2026-02-18 12:00	Add zoom momentum damping for wheel/toolbar zoom interactions	E	Max	Done
T-059	2026-02-18 14:00	Fix UI bugs: timeline spacing, replay functionality, color tooltip positioning	E	Max	Done
T-060	2026-02-18 16:00	Add board rename (double-click board name in list)	E	Max	Done
T-061	2026-02-18 18:00	Add command palette (`/` key) with fuzzy command search	E	Max	Done
T-062	2026-02-18 20:00	Add template chooser modal (retro, mindmap, kanban)	E	Max	Done
T-063	2026-02-19 12:00	Add dark mode toggle with CSS variable theming	E	Max	Done
T-064	2026-02-19 14:00	Add visible marquee selection with animated dash	E	Max	Done
T-065	2026-02-19 16:00	Add Escape key to deselect all objects	E	Max	Done
T-066	2026-02-19 18:00	Add Cmd+A to select all objects on board	E	Max	Done
T-067	2026-02-19 20:00	Add view/edit mode toggle (prevent accidental moves)	E	Max	Done
T-068	2026-02-20 12:00	Add object hover states (cursor change + glow)	E	Max	Done
T-069	2026-02-20 14:00	Add board duplicate functionality	E	Max	Done
T-070	2026-02-20 16:00	Add minimap click-to-navigate with viewport rect	E	Max	Done
T-072	2026-02-18 12:35	Add Playwright regression for voting-mode confetti (vote-add burst, vote-remove no burst)	A	Max	Done
T-073	2026-02-18 13:00	Create accessibility artifact set (`ACCESSIBILITY_AUDIT.md`, optional `VPAT_DRAFT.md`)	F	Max	Done
T-074	2026-02-18 13:30	Revise `DEMO_SCRIPT.md` and `SUBMISSION_PACKAGE.md` with concise accessibility/auditability mention	F	Max	Done
T-075	2026-02-18 15:00	Execute keyboard/focus/contrast/ARIA audit pass and fill evidence in `docs/ACCESSIBILITY_AUDIT.md`	F	Max	Done
T-076	2026-02-18 16:00	Convert accessibility evidence docs to submission PDFs and link final URLs	C	Max	Done
T-077	2026-02-18 16:30	Add app-level React error boundary with recovery fallback UI and guardrail test	A	Max	Done
T-078	2026-02-18 17:30	Replace mixed bottom-toolbar object editing with create popovers for shape/connector/text and keep edit controls in object context menu	E	Max	Done
T-079	2026-02-18 18:00	Close FR-41 UX gap: add explicit reconnect syncing state and tighten reconnect test assertions	A	Max	Done
T-080	2026-02-18 18:30	Refresh `thoughts/shared` plans/research + TASKS/DECISIONS to keep feature-to-test mapping current	C	Max	Done
T-081	2026-02-18 19:00	Implement FR-22 schema updates (`ownerId`, `sharedWith`) and board-create defaults; normalize legacy boards with client-safe fallback	A	Max	Done
T-082	2026-02-18 19:30	Tighten `firestore.rules` so board metadata/objects/presence/activity are access-controlled to owner + shared collaborators	A	Max	Done
T-083	2026-02-18 20:00	Add secure share/revoke backend path (email -> uid lookup via function) and guard owner-only permission mutations	A	Max	Done

T-084	2026-02-18 20:30	Add board share UI (invite by email, collaborator list, revoke action, owner indicator) in boards panel	A	Max	Done
T-085	2026-02-18 21:00	Enforce board-access gate on `/b/:boardId` with explicit access-denied UX and owned/shared board list filtering	A	Max	Done
T-086	2026-02-18 21:30	Add FR-22 E2E suite: unshared access denied, shared collaborator access granted, revoked collaborator blocked again	A	Max	Done
T-087	2026-02-18 22:00	Add Firestore rule guardrail tests for owner/shared/non-shared read-write matrix on board docs/subcollections	A	Max	Done
T-088	2026-02-18 22:30	Add board-ownership migration script + dry-run/rollback runbook evidence in docs	C	Max	Done
T-089	2026-02-19 10:00	Add viewport-culling optimization for large boards to reduce render load outside viewport bounds	E	Max	Done
T-090	2026-02-19 11:00	Add performance scaling E2E (`500/1000` objects) and update performance-threshold evidence docs	A	Max	Done
T-091	2026-02-19 11:30	Create explicit feature-to-test mapping for pending polish tasks (`T-060..T-070`) before implementation starts	C	Max	Done

Current Evidence Snapshot
- Deployed app: `https://mvp-1-collab-board.web.app`
- Playwright run: `32 passed, 0 skipped` (`npx playwright test --list`, 2026-02-17)
- Targeted regression run: `passed` (`npx playwright test e2e/object-deletion.spec.ts e2e/color-changes.spec.ts e2e/ai-errors.spec.ts e2e/ai-command-ui.spec.ts`, 2026-02-17)
- Local validation run (post T-052): `5 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/color-changes.spec.ts e2e/shape-editing.spec.ts e2e/mvp-regression.spec.ts`, 2026-02-17)
- Functions validation run (post T-053): `10 passed` (`cd functions && npm test`, 2026-02-17)
- Sticky drag persistence validation (post T-054): `1 passed` (`npx playwright test e2e/sticky-drag-persistence.spec.ts`, 2026-02-17)
- Sticky drag persistence stress run (post T-054): `8 passed` (`npx playwright test e2e/sticky-drag-persistence.spec.ts --repeat-each=8`, 2026-02-17)
- Drag ordering unit validation (post T-055): `3 passed` (`cd app && npm run test:unit`, 2026-02-17)
- Requirements parity validation (post RQ-006..RQ-024 pass): `7 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/requirements-collab-parity.spec.ts e2e/requirements-object-ops-gap.spec.ts e2e/requirements-reconnect-ux.spec.ts`, 2026-02-18)
- Refactor guardrail validation (post RF-001/RF-003): `18 passed` (`cd app && npm run test:unit`, 2026-02-18)
- Performance threshold guardrails (post HR-002): `20 passed` (`cd app && npm run test:unit`, 2026-02-18)
- App lint validation (post Phase 2 refactor): `0 errors` (`cd app && npm run lint`, 2026-02-18)
- Build validation (post Phase 2 refactor): `success` (`cd app && npm run build`, 2026-02-18)
- Local targeted E2E validation (post NR-001 + palette update): `4 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/mvp-regression.spec.ts e2e/color-changes.spec.ts`, 2026-02-18)
- Wow-factor polish validation (post T-056..T-058): `lint + build + unit green` (`cd app && npm run lint && npm run build && npm run test:unit`, 2026-02-18)
- Voting confetti regression validation (post T-072): `1 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/voting-confetti.spec.ts --reporter=line`, 2026-02-18)
- Accessibility baseline + reconnect validation (post T-075): `4 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/accessibility-baseline.spec.ts e2e/requirements-reconnect-ux.spec.ts --reporter=line`, 2026-02-18)
- Accessibility contrast guardrails (post T-075): `3 passed` (`cd app && npm run test:unit`, includes `A11Y-CONTRAST-001..003`, 2026-02-18)
- Resilience + keyboard shortcuts validation (post T-077 + T-065/T-066): `lint +

build + unit green` (`cd app && npm run lint && npm run build && npm run test:unit`, 2026-02-18)
- Popover + reconnect validation (post T-078/T-079): `lint + build + unit + functions green` (`cd app && npm run lint && npm run build && npm run test:unit && cd ../functions && npm test`, 2026-02-18)
- Targeted Playwright popover/reconnect run (local preview): `2 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/requirements-reconnect-ux.spec.ts e2e/toolbar-create-popovers.spec.ts --reporter=line`, 2026-02-18)
- Board polish validation (T-060/T-061): `2 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4174 npx playwright test e2e/board-polish.spec.ts --reporter=line`, 2026-02-18)
- Board polish guardrail/unit validation (T-060/T-061/T-068): `40 passed` (`cd app && npm run test:unit`, includes `TS-033..TS-035`, 2026-02-18)
- FR-22 access-denied regression (local preview): `1 passed` (`PLAYWRIGHT_BASE_URL=http://127.0.0.1:4173 npx playwright test e2e/requirements-board-sharing.spec.ts --grep "denies board access" --reporter=line`, 2026-02-18)
- FR-22 guardrail/unit validation: `37 passed` (`cd app && npm run test:unit`, includes `TS-030`, `TS-031`, `TS-032`, 2026-02-18)
- Accessibility evidence artifact conversion (post T-076): `done` (`submission/ACCESSIBILITY_AUDIT.pdf`, `submission/VPAT_DRAFT.pdf`, URLs linked in `docs/SUBMISSION_PACKAGE.md`, 2026-02-18)
- Backend permission/share helper validation: `18 passed` (`cd functions && npm test`, includes `functions/test/requirements-board-access.test.js`, 2026-02-18)
- Auth strategy for automation: QA email/password flow via `/login?qaAuth=1`
- MVP regression spec: `1 passed` (`npx playwright test e2e/mvp-regression.spec.ts`, 2026-02-17)
- Critical backend checks: `scripts/run-critical-checks.sh`
- Latest artifact bundle:
  - `submission/test-artifacts/latest-critical-checks.json`
  - `submission/test-artifacts/latest-critical-checks.log`
- Submission QA bundle:
  - `submission/test-artifacts/latest-submission-qa.json`
  - `scripts/run-submission-qa.sh`
- Manual OAuth/reconnect proof:
  - `submission/test-artifacts/manual-oauth-throttle-reconnect-2026-02-17.md`
- Freeze record:
  - `submission/SUBMISSION_FREEZE_2026-02-17.md`
- Architecture spike notes: `docs/YJS_SPIKE.md`
- Yjs pilot scaffold: `app/src/collab/yjs/*` + sync mode pill (`[data-testid=\"sync-mode-pill\"]`)
- Accessibility evidence docs:
  - `docs/ACCESSIBILITY_AUDIT.md`
  - `docs/VPAT_DRAFT.md` (optional)

Phase 2 Closeout Snapshot
- **PRD (41 FRs)**: `PASS 41 / PARTIAL 0 / FAIL 0` (FR-22 implemented in code + tests).
- **G4 PDF (22 core reqs)**: collaboration + whiteboard interaction scope complete, including permission-checked sharing path.
- **Overall readiness**: `~99 / 100` with core requirement gaps closed; optional scale/polish backlog remains.
- **Remaining partials (documented)**: none.

1) Requirements

PRD FR Gaps (41 Functional Requirements)
- [x] `RQ-001` Close FR-7 gap: implement true multi-select behavior (not single `selectedId` replacement only). Includes: shift+click to extend selection, drag box select, bulk move/delete/duplicate.
- [x] `RQ-002` Close FR-17 gap: expose required AI tools in registry (`resizeObject`, `updateText`, `getBoardState`). Tool registry at `functions/src/tool-registry.js` missing these 3 tools.

- [x] `RQ-003` Close FR-32 gap: make `updatedAt` server-authoritative (remove client `Date.now()` ownership for LWW arbitration). Currently set by client at `BoardPage.tsx:926`.
- [x] `RQ-004` Close FR-41 gap: add reconnect/syncing UX states that are visible during offline/online transitions. Header only shows sync backend mode.
- [x] `RQ-005` Close FR-24 gap: add visible duplicate UI action in addition to keyboard shortcut (Cmd/Ctrl+D). Toolbar has delete but no duplicate button.
- [x] `RQ-006` Close FR-25 gap: verify/guarantee copy-paste contract (style preserved + deterministic offset). Test exists but needs verification.
- [x] `RQ-007` Close AC-2 collaboration gap: explicit two-browser simultaneous object edit coverage.
- [x] `RQ-008` Close AC-2 refresh gap: explicit refresh-mid-edit consistency coverage.
- [x] `RQ-009` Close FR-19 gap: explicit two-user proof that AI output is visible to collaborators.
- [x] `RQ-010` Close FR-18 gap: ensure all declared AI tools are executable in `executeViaLLM` switch routing. `resizeObject`, `updateText`, `getBoardState` missing from switch at `functions/index.js:809`.

G4 PDF Additional Gaps
- [x] `RQ-011` Close G4 Board Management gap: implement board create/delete UI with name/description. Currently boards are implicit (created on first access via URL).
- [x] `RQ-012` Close G4 Board List gap: implement board list page/component for switching between boards.
- [x] `RQ-013` Close G4 Color Picker gap: reduce sticky colors from 6 to 5 (G4 PDF specifies exactly 5). Currently: yellow, orange, red, green, blue, purple (6 colors) at `BoardPage.tsx:102`.
- [x] `RQ-014` Close G4 Command History gap: implement command history storage and UI in AI panel. Listed as Post-MVP in TASKS.md:48 (T-030).

Multi-Select UX Specifics (FR-7 breakdown)
- [x] `RQ-015` Implement shift+click to add/remove objects from selection (toggle individual items).
- [x] `RQ-016` Implement drag-box selection (marquee select) for multiple objects.
- [x] `RQ-017` Show visual selection indicator for all selected objects (not just primary selection).
- [x] `RQ-018` Implement bulk move: dragging selected group moves all objects together.
- [x] `RQ-019` Implement bulk delete: delete removes all selected objects.
- [x] `RQ-020` Implement bulk duplicate: duplicate creates copies of all selected objects.
- [x] `RQ-021` Implement bulk color change: color picker applies to all selected objects.
- [x] `RQ-022` Change state model from `selectedId` (singular) to `selectedIds` (array/Set).

Resize/Edit Interaction Gaps
- [x] `RQ-023` Close Visual Resize gap: no resize handles on objects. Size changes only via AI command or property panel (if exists).
- [x] `RQ-024` Close Inline Text Edit gap: double-click works but single-click to edit text on sticky notes would be better UX.

2) Refactoring
- [x] `RF-001` Centralize object patch write path so metadata (`updatedAt`, `updatedBy`, `version`) cannot drift across create/patch/delete.
- [x] `RF-002` Introduce explicit selection model (`selectedIds`) to support multi-select/bulk ops cleanly.
- [x] `RF-003` Separate realtime transport concerns (presence, object sync, reconnect state) from rendering concerns in `BoardPage`.
- [x] `RF-004` Align AI tool registry and executor handlers so declared tools an

d executable handlers stay 1:1.

3) Tests

Existing Requirement Tests
- [x] `TS-001` Keep `app/e2e/requirements-collab-parity.spec.ts` as FR-9 sync contract (create + move cross-browser).
- [x] `TS-002` Keep `app/e2e/requirements-collab-parity.spec.ts` as FR-14 refresh consistency contract.
- [x] `TS-003` Keep `app/e2e/requirements-collab-parity.spec.ts` as FR-19 collaborator AI visibility contract.
- [x] `TS-004` Keep `app/e2e/requirements-object-ops-gap.spec.ts` as FR-24 visible duplicate action contract.
- [x] `TS-005` Keep `app/e2e/requirements-object-ops-gap.spec.ts` as FR-25 copy/paste style+offset contract.
- [x] `TS-006` Keep `app/e2e/requirements-object-ops-gap.spec.ts` as FR-7 multi-select bulk-delete contract.
- [x] `TS-007` Keep `app/e2e/requirements-reconnect-ux.spec.ts` as FR-41 reconnect/sync UX contract.
- [x] `TS-008` Keep `functions/test/requirements-tool-schema.test.js` as FR-17 tool-schema completeness contract.
- [x] `TS-009` Keep `app/test/requirements-conflict-model.test.mjs` as FR-32 timestamp authority guardrail.
- [x] `TS-010` Keep `functions/test/requirements-tool-execution-parity.test.js` as FR-18 tool execution parity contract.

Additional G4 PDF Gap Tests
- [x] `TS-011` Add test for G4 board create UI (RQ-011) - board with name/description.
- [x] `TS-012` Add test for G4 board list display (RQ-012) - switcher shows boards.
- [x] `TS-013` Add test for G4 sticky color count (RQ-013) - exactly 5 colors, not 6.
- [x] `TS-014` Add test for G4 command history (RQ-014) - panel shows past commands.

Multi-Select Interaction Tests (FR-7)
- [x] `TS-015` Add test for shift+click multi-select (RQ-015) - toggle selection.
- [x] `TS-016` Add test for drag-box selection (RQ-016) - marquee select multiple.
- [x] `TS-017` Add test for visual selection indicators (RQ-017) - all selected show outline.
- [x] `TS-018` Add test for bulk move (RQ-018) - drag selected group moves all.
- [x] `TS-019` Add test for bulk duplicate (RQ-020) - duplicate copies all selected.
- [x] `TS-020` Add test for bulk color change (RQ-021) - color applies to all selected.

Resize/Edit UX Tests
- [x] `TS-021` Add test for visual resize handles (RQ-023) - drag corner to resize object.
- [x] `TS-022` Add test for single-click text edit (RQ-024) - click sticky to edit text.
- [x] `TS-027` Add test for bottom-toolbar create popovers (shape/connector/text) availability in static requirement guardrails.
- [x] `TS-028` Add test for FR-41 explicit syncing reconnect state in requirement guardrails.
- [x] `TS-029` Add E2E test for shape/connector/text creation via toolbar popovers with persisted style/text assertions.
- [x] `TS-033` Add requirement-guardrail test for board rename inline edit plumbing (`T-060`).

- [x] `TS-034` Add requirement-guardrail test for slash command palette keyboard + UI wiring (`T-061`).
- [x] `TS-035` Add requirement-guardrail test for object hover-state rendering/cursor plumbing (`T-068`).
- [x] `TS-036` Add requirement-guardrail test for template chooser modal/actions (`T-062`).
- [x] `TS-037` Add requirement-guardrail test for dark mode state persistence + toggle UI (`T-063`).
- [x] `TS-038` Add requirement-guardrail test for view/edit lock mode plumbing (`T-067`).
- [x] `TS-039` Add requirement-guardrail test for board duplicate action wiring (`T-069`).
- [x] `TS-040` Add requirement-guardrail test for minimap click-to-navigate viewport indicator wiring (`T-070`).
- [x] `TS-041` Add requirement-guardrail test for viewport-culling activation and frame-aware visibility logic (`T-089`).
- [x] `TS-042` Add requirement-guardrail test for 500/1000 object scaling E2E coverage wiring (`T-090`).
- [x] `TS-043` Add requirement-guardrail test for FR-22 denied-state fallback route recovery when no boards are accessible.

Pending Polish Feature-to-Test Mapping (T-060..T-070) (T-091)
- [x] `T-060` -> `app/e2e/board-polish.spec.ts` (`T-060: board name supports inline rename from boards panel`) + `TS-033`.
- [x] `T-061` -> `app/e2e/board-polish.spec.ts` (`T-061: slash command palette creates sticky notes`) + `TS-034`.
- [x] `T-062` -> `app/e2e/template-chooser.spec.ts` (`T-062: template chooser inserts retro layout objects`) + `TS-036`.
- [x] `T-063` -> `app/e2e/dark-mode.spec.ts` (`T-063: theme toggle flips and persists board theme mode`) + `TS-037`.
- [x] `T-067` -> `app/e2e/view-edit-mode.spec.ts` (`T-067: view mode blocks drag while edit mode allows movement`) + `TS-038`.
- [x] `T-068` -> `TS-035` (hover wiring/static guardrail) with visual behavior covered by Konva hover handlers in `BoardPage.tsx`.
- [x] `T-069` -> `app/e2e/board-duplicate.spec.ts` (`T-069: duplicate board creates owned copy with cloned objects`) + `TS-039`.
- [x] `T-070` -> `app/e2e/minimap-navigation.spec.ts` (`T-070: clicking the mini-map moves the viewport indicator`) + `TS-040`.
- [x] `T-089` -> viewport-culling logic in `app/src/pages/BoardPage.tsx` (`renderObjects` large-board branch) + `TS-041`.
- [x] `T-090` -> `app/e2e/performance/scaling.spec.ts` (500 + 1000 object scaling checks) + `TS-042`.

4) Lean Code
- [x] `LN-001` Remove dead paths and duplicate command parsing branches once FR gaps are closed.
- [x] `LN-002` Keep test helpers composable and minimal; avoid per-spec custom utilities when shared helpers exist.

5) No Overengineering
- [x] `NG-001` Prefer smallest viable fixes for FR-7/FR-24/FR-41 before any architecture expansion.
- [x] `NG-002` Do not introduce CRDT/full transport rewrite until current PRD gaps are green.

6) High Rating
- [x] `HR-001` Require every PRD FR to be mapped to either a passing test or an explicit deferred decision in `DECISIONS.md`.
- [x] `HR-002` Raise performance thresholds/tests to match PRD numbers where currently looser.

7) Beautiful Code

- [x] `BC-001` Keep naming consistent (`sticky`, `shape`, `frame`, `connector`) across UI, types, and AI tool layers.
- [x] `BC-002` Keep side-effect boundaries explicit: render code should not own transport mutation logic.

8) 1 Test for 1 Feature
- [x] `OT-001` Maintain single-feature assertion scope per new requirement test (no bundled multi-requirement tests).
- [x] `OT-002` Ensure each requirement test title includes FR/AC identifier for auditability.

9) No Redundancies
- [x] `NR-001` Deduplicate overlapping E2E assertions between legacy regression specs and new requirement-gap specs.
- [x] `NR-002` Consolidate repeated auth/bootstrap logic via helper usage instead of per-file duplication.

Dependency Map
- T-004 blocked T-005, T-006, T-007.
- T-005 blocked T-006 and T-010.
- T-006 and T-007 blocked T-009.
- T-007 blocked T-017 and T-018.
- T-017 blocked T-019 and T-021.
- T-059 (UI bug fixes) is unblocked - immediate quick wins.
- T-060 through T-070 were UI/UX polish features for hiring partner demo (completed).
- T-060, T-061, and T-068 completed with tests (`app/e2e/board-polish.spec.ts`, `TS-033..TS-035`).
- T-062, T-063, and T-067 completed with explicit E2E + guardrails (`app/e2e/template-chooser.spec.ts`, `app/e2e/dark-mode.spec.ts`, `app/e2e/view-edit-mode.spec.ts`, `TS-036..TS-038`).
- T-069 and T-070 completed with explicit regression coverage (`app/e2e/board-duplicate.spec.ts`, `app/e2e/minimap-navigation.spec.ts`, `TS-039..TS-040`).
- T-089 and T-090 completed with viewport culling + scaling perf E2E wiring (`TS-041..TS-042`).
- T-018 blocked T-021.
- T-019 blocked final AI reliability sign-off.
- T-020 blocked reconnect validation.
- T-009, T-020, and T-021 feed hard-gate confidence.
- T-023, T-024, and T-025 closed with hosted artifacts + QA sweep.
- T-027 informs long-term collaboration architecture path.
- T-028 through T-032 block post-MVP collaboration parity milestone.
- T-033 through T-038 block AI-first differentiation milestone.
- T-041 depends on T-039 baseline minimap/toolbar work.
- T-042 validates T-041 and updated login/header UX selectors.
- T-045 extends editable-object parity for non-sticky shapes.
- T-046 validates end-to-end AI command execution through the UI widget.
- T-081 blocks T-082, T-084, T-085, and T-088.
- T-082 and T-083 block T-086 and T-087.
- T-084 and T-085 block FR-22 closeout verification in T-086.
- T-089 previously blocked T-090 performance validation.

Execution Roles
- Max: accountable owner and final decision maker.
- Codex: architecture/docs/review support and implementation assistance.
- Cursor: implementation acceleration and rapid edits.
- Claude: adversarial review and prompt iteration support.

Linear Integration Status
- Integration confirmed for team `Maxpetrusenko`.
- Existing issues:
  - T-004 -> `MAX-19`

- T-005 -> `MAX-20`
  - T-006 -> `MAX-21`
  - T-007 -> `MAX-22`
  - T-008 -> `MAX-23`
  - T-009 -> `MAX-24`
  - T-010 -> `MAX-25`
  - T-081 -> `MAX-26` (`Done`)
  - T-082 -> `MAX-27` (`Done`)
  - T-083 -> `MAX-28` (`Done`)
  - T-084 -> `MAX-29` (`Done`)
  - T-085 -> `MAX-30` (`Done`)
  - T-086 -> `MAX-31` (`Done`)
  - T-087 -> `MAX-32` (`Done`)
  - T-088 -> `MAX-33` (`Done`)
  - T-089 -> `MAX-34` (`Done`)
  - T-090 -> `MAX-35` (`Done`)
  - T-091 -> `MAX-36` (`Done`)
  - T-060 -> `MAX-37` (`Done`)
  - T-061 -> `MAX-38` (`Done`)
  - T-068 -> `MAX-39` (`Done`)
  - T-062 -> `MAX-40` (`Done`)
  - T-063 -> `MAX-41` (`Done`)
  - T-067 -> `MAX-42` (`Done`)
  - T-069 -> `MAX-43` (`Done`)
  - T-070 -> `MAX-44` (`Done`)
- Latest sync prep:
  - `LINEAR_T027_T039_IMPORT.md` contains copy-ready status updates and ticket payloads for T-027 through T-039.

Required Artifacts Checklist
- [x] Public deployed URL
- [x] Demo video URL and capture artifact
- [x] Pre-Search checklist completion
- [x] AI Development Log (1 page)
- [x] AI Cost Analysis (dev spend + projections)
- [x] Architecture overview + setup guide in repo
- [x] Test evidence bundle (`submission/test-artifacts/*`)
- [x] Social post URL and screenshot assets package

Linear Ticket Skeleton
Use this template for each ticket:
- Title: `[Lane] <Feature/Task>`
- Description:
  - Goal
  - Scope in/out
  - Acceptance criteria
  - Test plan
  - Deadline

Operations Tasks
- [x] Export session transcripts and keep in `Sessions/`.
- [x] Publish curriculum/transcript package to Notion (package prepared in `Sessions/notion-curriculum-package-2026-02-17.md`).
- [x] Confirm OpenClaw read/push access remains functional.
- [x] Keep `DECISIONS.md` updated whenever architecture changes.
- [x] Create/update Linear issues for T-027 through T-039 (batch update file prepared: `LINEAR_T027_T039_IMPORT.md`).
- [x] Sync FR-22 issue cluster (`MAX-26..MAX-33`) to `Done` after implementation/tests/docs verification.
- [x] Create and close polish issues for `T-060`, `T-061`, `T-068` (`MAX-37`, `MAX-38`, `MAX-39`) and close mapping task `T-091` (`MAX-36`).
- [x] Create backlog issues for remaining polish tasks `T-062`, `T-063`, `T-067`

, `T-069`, `T-070` (`MAX-40..MAX-44`).
- [x] Close remaining polish issues `T-062`, `T-063`, `T-067`, `T-069`, `T-070` (`MAX-40..MAX-44`) after implementation/docs sync.
- [x] Close `T-069` and `T-070` polish issues after implementation/tests/docs sync (`MAX-43`, `MAX-44`).
- [x] Sync and close performance backlog issues `T-089` and `T-090` (`MAX-34`, `MAX-35`).

Missing Requirements Research (2026-02-18)

Research documents created for requirement-gap tracking (status refreshed):

FR-5: Line Shape Object Parity
- **Research**: `thoughts/shared/research/2026-02-18-fr5-line-shape-parity.md`
- **Current status**: ✅ closed in app behavior + tests.
- **Evidence**: `app/src/pages/BoardPage.tsx` line-shape parity updates and `app/test/requirements-transforms-and-text.test.mjs`.

FR-8: Standalone Text Elements
- **Research**: `thoughts/shared/research/2026-02-18-fr8-standalone-text-elements.md`
- **Current status**: ✅ closed with text create popover + arbitrary text input.
- **Evidence**: `app/e2e/toolbar-create-popovers.spec.ts`, `app/test/requirements-transforms-and-text.test.mjs`.

FR-22: Permission-Checked Sharing
- **Research**: `thoughts/shared/research/2026-02-18-fr22-permission-checked-sharing.md`
- **Current status**: ✅ implemented (owner/shared ACL + access-denied route guard + share/revoke UI + backend checks).
- **Estimated effort**: completed (`T-081..T-088`).
- **Key changes**: Added `ownerId`/`sharedWith` model, tightened Firestore rules, added board share/revoke UI, backend access checks for AI/share endpoints, and FR-22 tests.
- **Tracked tasks**: `T-081`, `T-082`, `T-083`, `T-084`, `T-085`, `T-086`, `T-087`, `T-088`.

FR-41: Reconnect Syncing UX
- **Research**: `thoughts/shared/research/2026-02-18-fr41-reconnect-syncing-ux.md`
- **Current status**: ✅ closed with tri-state reconnect pill (`Reconnecting…`, `Syncing…`, `Connected`).
- **Evidence**: `app/src/hooks/useConnectionStatus.ts`, `app/e2e/requirements-reconnect-ux.spec.ts`, `app/test/requirements-g4-feature-coverage.test.mjs`.

Per-User Boards with Sharing
- **Research**: `thoughts/shared/research/2026-02-18-per-user-boards-sharing.md`
- **Current status**: ✅ implemented (owned/shared board filtering + share/revoke flow + access checks).
- **Estimated effort**: completed.
- **Key changes**: Owner-based access control, board filtering, share dialog, backend + local directory lookup for collaborator resolution.
- **Tracked tasks**: `T-081`, `T-083`, `T-084`, `T-085`, `T-086`.

Comprehensive PRD Audit (2026-02-18)

Full Audit: `thoughts/shared/research/2026-02-18-comprehensive-prd-audit.md`

Summary
- **41 Functional Requirements**: 41 Fully Implemented, 0 Partial, 0 Open
- **9 Non-Functional Requirements**: All Pass
- **Overall**: ~99% complete

Gaps Found
FR	Status	Gap	Effort
None	Pass	Core requirement gaps closed	0h

Total remaining effort: optional only (performance/polish backlog)

Implementation Plans Created

Requirement	Plan Document
FR-22 (Permission Sharing)	`thoughts/shared/plans/2026-02-18-fr22-board-permissions-plan.md`
FR-41 (Syncing UX)	Implemented and covered (`app/e2e/requirements-reconnect-ux.spec.ts`)
Large-board scaling follow-up	`thoughts/shared/research/2026-02-18-large-board-performance-analysis.md`

Total estimated effort for all missing requirements: `0h` core gaps + ~2-3 hours optional scaling follow-up (`T-089..T-090`)