

# Scanning Workflow & Production Dashboard Overview

## 1. Inventory Management

### 1.1 Business Context

#### Suppliers & Purchase Orders

- Onboard materials via **purchase orders** (POs) from **suppliers**.
- Each PO may contain multiple **lines**, each specifying an **item** and quantity.

#### Materials & Items

- **Materials** (e.g. "Acetone") represent chemical types, identified by CAS number and group.
- **Items** are specific purchasable forms of a material (e.g. 200 L Methanol drum for £385.00 from Kimia), uniquely defined by material, supplier, packaging, and cost metadata.

#### Receipt & Batching

- Upon arrival, each delivery spawns a **batch** (type: new, repro, etc.) tied to an item and - if type is "new" - optionally back-linked to its PO.
- Batch data is updated with its batch code upon receipt using the application UI.
- Batches record a total volume; incremental additions (topping up, combining) use **batch\_inputs** events.

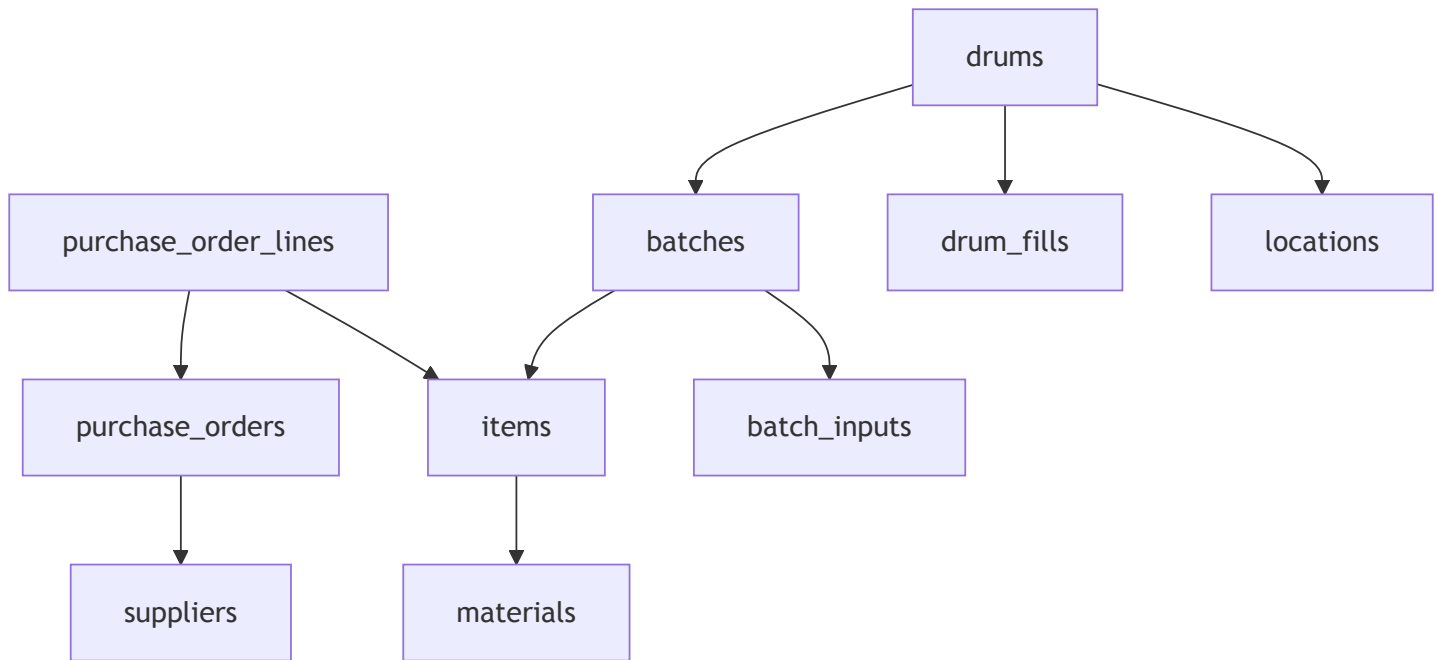
#### Drum Lifecycle

- Physical **drums** are created per batch, carrying a **serial\_number**, **current\_volume**, **status** (in-stock, in-use, empty), and **location**.
- **drum\_fills** track each fill event (volume\_added, timestamp).
- **batch\_inputs** track non-drum-specific volume events (e.g. bulk transfers).

# Locations

- `locations` is a hierarchical table (warehouse → aisle → rack → shelf) to which drums (and optionally batches) are assigned.

## 1.2 Core Tables & Relationships

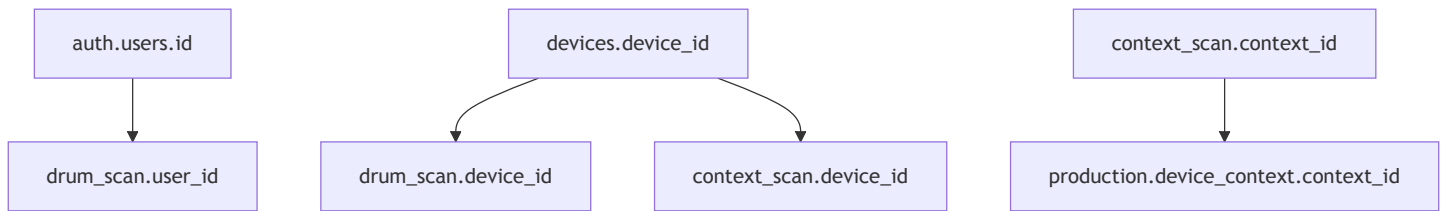


## 2. Scanning & Audit Logs

### 2.1 Overview

- All barcode and QR scans by operators (drum labels or context codes) are logged in **drum\_scan** and **context\_scan**.
- Each scan captures: user, device, raw code, interpreted entity, timestamp, status/error, and optional metadata.
- **devices** stores scanner inventory (hw\_id, model, OS version, last\_seen).

## 2.2 Key Relationships



## 3. Production Workflow & Monitoring

### 3.1 Business Process

#### 1. Orders & Jobs

- Internal/customer **orders** schedule production: define item, quantity (# of drums), date, and priority.
- Orders spawn one or more **jobs** linked to an **input\_batch** and scheduled start/end.

#### 2. Operations

- Each job breaks into discrete **operations** (e.g. mix, heat, distill, filter).
- Operations track planned vs. actual times and status flags.

#### 3. Resource Allocation

- **operation\_drums** ties scanned drums (with volumes transferred) to operations.
- **drum\_usage** records longer-term drum assignments to operations.

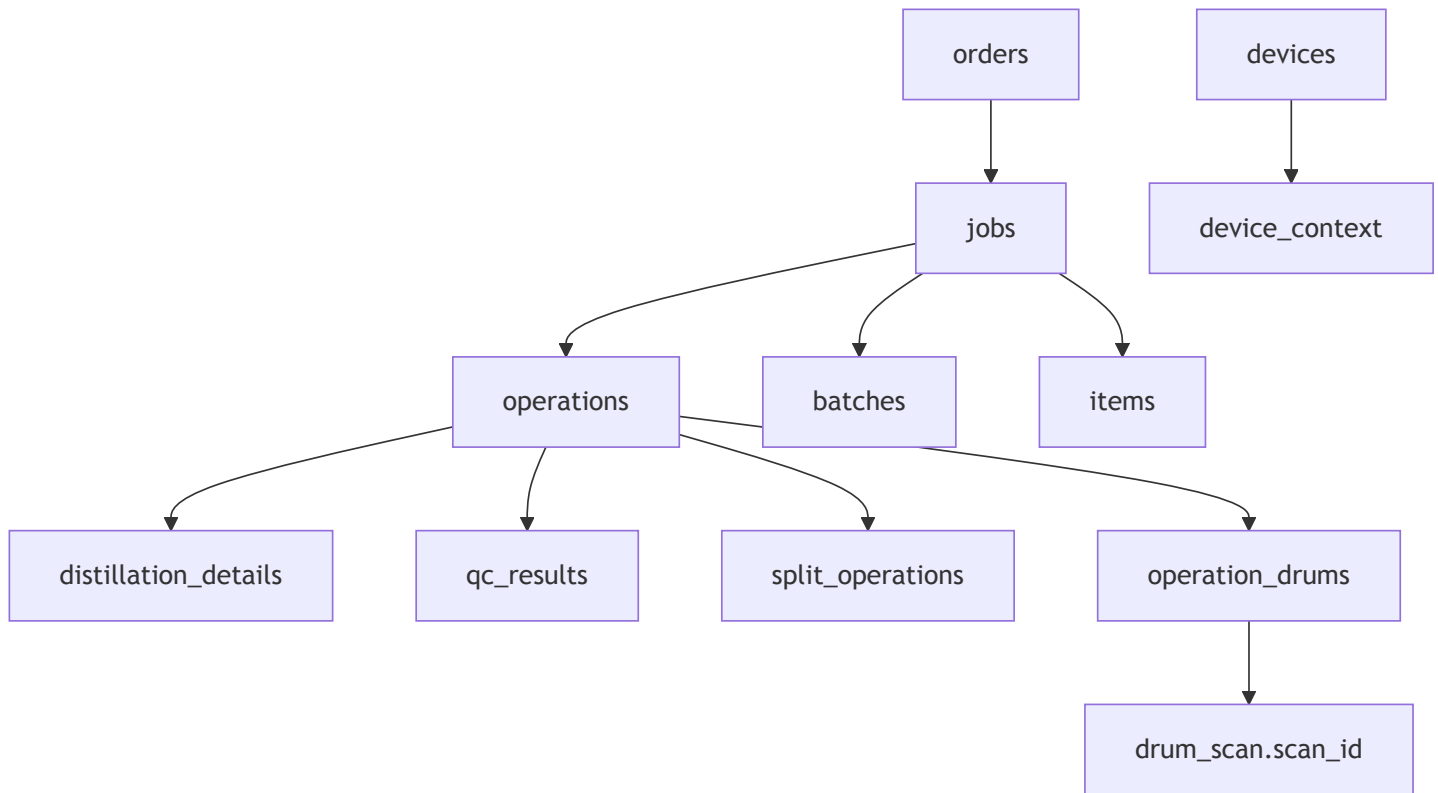
#### 4. Quality & Splits

- **distillation\_details** (raw\_volume, expected\_yield, JSON) and **qc\_results** (grade, tested\_at, volume, metadata).
- **split\_operations** capture parent→child splits for parallel processes or re-batches.

#### 5. Context Binding

- Operators scan a station QR to bind a device to a context via **device\_context**, ensuring subsequent drum scans map to the correct job/operation.

## 3.2 Core Relationships



## 4. End-to-End Flow Summary

1. **Procurement:** Create PO → receive goods → batch → drum\_fill → store.
2. **Inventory:** Real-time tracking via `drum_scan` , `batch_inputs` , `drum_fills` , and `context_scan` .
3. **Production Kickoff:** Order → Job → schedule.
4. **Execution:** Station context scan → `drum(scan)` → `operation_drums` record → update `drums.current_volume` & status.
5. **Quality:** Distillation and QC events captured.
6. **Fulfillment:** Job completes → dispatch scans → final status updates.

## 5. UI & Workflow Patterns (Next.js + Tailwind)

- **Task Dashboard:** Cards for active orders, showing item, quantity, schedule, status, and progress bar.

- **Context-Scan Wizard:** Stepwise UI (“Scan Station → Scan Drum(s) → Confirm”) backed by `/api/operations/:opId/context-scan`.
- **Drum Detail Timeline:** Vertical timeline of inventory, scan, operation, and QC events.
- **Bulk Actions:** Drag-drop or multi-select for assigning multiple drums.
- **Enforced Scans:** Each state transition in the UI gated by the corresponding scan log.

## 6. Adoption & Compliance Recommendations

1. **Simplicity:** Two-tap flows (“Scan location → Scan drum”).
2. **Feedback:** Visual (toasts), auditory (beep), and haptic (vibration) confirmation.
3. **Offline Resilience:** Local caching with automatic sync.
4. **Hands-on Training:** Live demos on the shop floor.
5. **Real-time Dashboards:** Display team compliance metrics publicly.
6. **Exception Handling:** Manager-approved overrides, fully audited.
7. **Supervisor Alerts:** Non-compliance reporting to management.

## 7. Gamification & Engagement

To drive consistent SOP adherence, boost morale, and deter negligence, we propose a gamified layer:

- **Prestige Levels & XP:** Award experience points for each valid scan (context + drum). Levels unlock badges, cosmetic themes, or simple perks.
- **Leaderboards:** Weekly and all-time rankings by points, scans per shift, or fastest context-drum cycles—balanced to reward both tenure and daily performance.
- **Ranked/ELO System:** A 5-star rating adjusts up/down based on scan accuracy, speed, and SOP compliance (e.g. missed or late scans penalize rating).
- **Achievements & Milestones:**
  - **License to Scan:** Milestone series (1/1, 1/5, 5/25, ...100/5 000 scans).
  - **Scantastic:** Complete one of each code-type scan (new, repro, station QR).
  - **Chemiconnoisseur:** Scan X distinct chemical types.
  - **Quick on the Draw:** Perform a valid context+drum scan within 10 s (then milestones at 5 s, 3 s).
  - **Auditor:** Use the “Report Issue” feature to flag a problem.

- **Recognition & Rewards:** Digital badges in profile, weekly email shout-outs, and a physical “Top Scanner” board in the lab.

**Business Rationale:** Gamification leverages intrinsic motivation and social competition to ensure high compliance. By making SOPs into achievements, workers organically adopt the desired behavior; management gains visibility into activity patterns and can reward true performers, reducing risk of negligent or malicious device use.

*This document combines high-level process flows, key data relationships, UI patterns, and behavioural design to present a comprehensive overview for business stakeholders.*