Production Setup: Explained Simply

n8n Performance Architecture — Burger Shop Analogy (200 VUs / 1 Hour Example)

1) Big Idea (In One Sentence)

Production is like a real restaurant: a greeter (nginx) spreads customers across multiple servers, a ticket board (Redis) organizes work, cooks (workers) handle heavy execution, and a receptionist (PgBouncer) prevents database connection chaos—so everything stays calm under load.

2) Architecture Diagram (ASCII)

```
⏺️ Production Setup: Explained Simply

  🍔 Imagine a REAL Professional Restaurant!

                    ╔═══════════════════════════════════════╗
                    ║         PRODUCTION = REAL RESTAURANT  ║
                    ║       Greeter + Servers + Cooks + Host║
                    ╚═══════════════════════════════════════╝


          👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤 👤

                         200 customers arrive at once!
                                      │
                                      ▼
                    ┌─────────────────────────┐
                    │   👋 GREETER (nginx)    │
                    │                         │
                    │  "Welcome! Let me send  │
                    │   you to an open server"│
                    └────────────┬────────────┘
                                 │
                ┌────────────────┼────────────────┐
                │                │                │
                ▼                ▼                ▼
         ┌───────────────┐ ┌───────────────┐ ┌───────────────┐
         │ 👩‍🍳 Server 1  │ │ 👨‍🍳 Server 2  │ │ 👩‍🍳 Server 3  │
         │  (Webhook 1)  │ │  (Webhook 2)  │ │  (Webhook 3)  │
         │               │ │               │ │               │
         │ Takes orders! │ │ Takes orders! │ │ Takes orders! │
         └───────┬───────┘ └───────┬───────┘ └───────┬───────┘
                 │                 │                 │
                 └─────────────────┼─────────────────┘
                                   │
                                   ▼
                    ┌─────────────────────────┐
                    │    📋 TICKET BOARD       │
                    │       (Redis)           │
                    │                         │
                    │  Order #1: 🍔            │
                    │  Order #2: 🍔            │
                    │  Order #3: 🍔            │
                    └────────────┬────────────┘
                                 │
            ┌───────────┬────────┼───────────┬───────────┐
            │           │        │           │           │
            ▼           ▼        ▼           ▼           ▼
        ┌───────┐   ┌───────┐   ┌───────┐   ┌───────┐   ┌───────┐
        │👨‍🍳Cook│  │👨‍🍳Cook│  │👨‍🍳Cook│  │👨‍🍳Cook│  │👨‍🍳Cook│
        │   1   │   │   2   │   │   3   │   │   4   │   │   5   │
        └───┬───┘   └───┬───┘   └───┬───┘   └───┬───┘   └───┬───┘
            │           │           │           │           │
            └───────────┴───────────┼───────────┴───────────┘
                                    │
                                    ▼
                    ┌─────────────────────────┐
                    │  👩‍💼 RECEPTIONIST       │
                    │    (PgBouncer)          │
                    │                         │
                    │ "One at a time please!" │
                    │ "I'll manage the line!" │
                    └────────────┬────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────┐
                    │   🗄️ FILING CABINET      │
                    │    (PostgreSQL)         │
                    │                         │
                    │   Organized! Peaceful!  │
                    └─────────────────────────┘
```

3) Everyone Has One Job (Why This Scales)

```
  🎯 Everyone Has ONE Job!

┌─────────────────────────────────────────────────────────────────┐
│                                                                 │
│   THE TEAM:                                                     │
│                                                                 │
│   👋 GREETER (nginx)                                             │
│      "I welcome customers and send them to open servers"        │
│                                                                 │
│   👩‍🍳👨‍🍳👩‍🍳 SERVERS x3 (Webhook Processors)                          │
│      "We ONLY take orders. That's it!"                          │
│                                                                 │
│   📋 TICKET BOARD (Redis)                                        │
│      "I keep all orders organized"                              │
│                                                                 │
│   👨‍🍳👨‍🍳👨‍🍳👨‍🍳👨‍🍳 COOKS x5 (Workers)                                      │
│     "We ONLY cook burgers. That's it!"                   │
│                                                          │
│  👩‍💼 RECEPTIONIST (PgBouncer)                              │
│     "I manage ALL traffic to the filing cabinet"         │
│                                                          │
│  🗄️ FILING CABINET (PostgreSQL)                           │
│     "I store everything safely"                          │
│                                                          │
└──────────────────────────────────────────────────────────┘

           EVERYONE DOES ONE THING REALLY WELL!
```

4) Why PgBouncer Matters (No More "Database not ready")

```
👩‍💼 The Magic of the Receptionist (PgBouncer)

┌──────────────────────────────────────────────────────────┐
│                                                          │
│  WITHOUT RECEPTIONIST (Queue+PG):                        │
│                                                          │
│     👨‍🍳💨 👨‍🍳💨 👨‍🍳💨 👨‍🍳💨 👨‍🍳💨                                 │
│         \    \    |    /    /                            │
│          \    \   |   /    /                             │
│           ▼    ▼  ▼  ▼    ▼                              │
│          ┌──────────────┐                                │
│          │ 🗄️ CABINET   │                                 │
│          │   CHAOS!     │  ◄── Everyone crashes in!      │
│          │  😵 JAMMED   │      "Database not ready!"      │
│          └──────────────┘                                │
│                                                          │
├──────────────────────────────────────────────────────────┤
│                                                          │
│  WITH RECEPTIONIST (Production):                         │
│                                                          │
│     👨‍🍳   👨‍🍳   👨‍🍳   👨‍🍳   👨‍🍳                                 │
│     │    │    │    │    │                                │
│     └────┴────┼────┴────┘                                │
│               ▼                                          │
│          ┌──────────┐                                    │
│          │ 👩‍💼 "LINE │                                     │
│          │  UP!"    │  ◄── Receptionist manages traffic  │
│          └──────────┘                                    │
│               │                                          │
│          One at a time                                   │
│               │                                          │
│               ▼                                          │
│          ┌──────────────┐                                │
│          │ 🗄️ CABINET   │                                 │
│          │   CALM!      │  ◄── Organized access!         │
│          │  😌 HAPPY    │      No crashes!               │
│          └──────────────┘                                │
│                                                          │
└──────────────────────────────────────────────────────────┘
```

5) Why nginx Matters (No Single "One Door" Bottleneck)

```
 👋 The Magic of the Greeter (nginx)

┌──────────────────────────────────────────────────────────────────┐
│                                                                  │
│  WITHOUT GREETER (Standalone & Queue+PG):                        │
│                                                                  │
│  👤👤👤👤👤👤👤👤👤👤 ──▶ 🚪 ──▶ 🧑‍🍳                                   │
│                           │       │                              │
│                       One door   One person                      │
│                                  takes ALL orders                │
│                                                                  │
│                       😰 "I CAN'T KEEP UP!"                       │
│                                                                  │
├──────────────────────────────────────────────────────────────────┤
│                                                                  │
│  WITH GREETER (Production):                                      │
│                                                                  │
│  👤👤👤👤👤👤👤👤👤👤 ──▶ 👋 GREETER                                  │
│                            │                                     │
│               "Who's free? Let me check..."                      │
│                            │                                     │
│             ┌──────────────┼───────────────┐                     │
│             │              │               │                     │
│             ▼              ▼               ▼                     │
│        👩‍🍳 "Me!"       👨‍🍳 "Me!"        👩‍🍳 "Me!"                   │
│        Server 1        Server 2        Server 3                  │
│                                                                  │
│        😌 "We share the customers equally!"                       │
│                                                                  │
└──────────────────────────────────────────────────────────────────┘
```

6) Performance Insights (Why CPU Drops to ~6%)

In Production, work stops piling up in one place. Requests are distributed across multiple webhook processors, heavy workflow execution runs in separate workers, and PgBouncer prevents connection storms to PostgreSQL. That combination cuts wasted CPU dramatically.

```
 🧮 Why CPU is Only 6%!

┌──────────────────────────────────────────────────────────────────┐
│                                                                  │
│  STANDALONE (112% CPU) - One person does EVERYTHING              │
│  ═══════════════════════════════════════════════                 │
│                                                                  │
│  🧑‍🍳 [████████████████████████████████████████] 112%                │
│      Take orders + Cook + Serve + Clean + Answer phone           │
│      ALL BY MYSELF = MAXED OUT                                   │
│                                                                  │
├──────────────────────────────────────────────────────────────────┤
│                                                                  │
│  QUEUE + PG (80% CPU) - Helpers but chaos at cabinet             │
│   ═══════════════════════════════════════════════               │
│                                                                 │
│   👨‍🍳 [█████████████████████░░░░░░░░░░░░░░░░░░░] 40%              │
│   👨‍🍳 [████████████████░░░░░░░░░░░░░░░░░░░░░░░░] 30%              │
│   🔄 [████████░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 10%  WASTED!      │
│       └── Fighting over the cabinet                             │
│                                                                 │
├─────────────────────────────────────────────────────────────────┤
│                                                                 │
│   PRODUCTION (6% CPU) - Everyone has ONE job, no fighting       │
│   ═══════════════════════════════════════════════               │
│                                                                 │
│   👋 [█░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 1%  Greeter      │
│   👩‍🍳 [█░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 1%  Server 1    │
│   👨‍🍳 [█░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 1%  Server 2    │
│   👩‍🍳 [█░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 1%  Server 3    │
│   👨‍🍳 [░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] <1% Cooks       │
│   👩‍💼 [█░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 1%  Reception   │
│   🔄 [░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░] 0%  NO WASTE!    │
│                                                                 │
│   Total: ~6% CPU                                                │
│                                                                 │
└─────────────────────────────────────────────────────────────────┘
```

7) Memory Insights (Why ~251 MB Stays Stable)

The same principle applies to memory: each component keeps only what it needs. Smaller responsibilities per container plus sensible limits/restarts help prevent slow growth and crashes under sustained load.

```
 🧠 Memory: Why Only 251 MB?

┌─────────────────────────────────────────────────────────────────┐
│                                                                 │
│   STANDALONE (1.17 GB) - One brain remembering EVERYTHING       │
│   ══════════════════════════════════════════════════════        │
│                                                                 │
│   👨‍🍳🧠 [████████████████████████████████████] 1.17 GB          │
│         │                                                       │
│         └── "I have to remember ALL customers,                  │
│              ALL orders, ALL recipes, EVERYTHING!"              │
│                                                                 │
├─────────────────────────────────────────────────────────────────┤
│                                                                 │
│   PRODUCTION (251 MB) - Shared memory + focused roles           │
│   ══════════════════════════════════════════════════════        │
│                                                                 │
│   👋🧠 [████░░░░░] Greeter - just remembers "who's free"         │
│   👩‍🍳🧠 [████░░░░░] Server - just remembers current orders      │
│   👨‍🍳🧠 [████░░░░░] Cook - just remembers current burger        │
│   👩‍💼🧠 [████░░░░░] Reception - just manages the line           │
│                                                                 │
└─────────────────────────────────────────────────────────────────┘
```

8) What Happens at 200 Customers for 1 Hour (Result Summary)

💥 What Happens at 200 Customers for 1 HOUR

```
┌──────────────────────────────────────────────────────────┐
│                                                          │
│  STANDALONE (After 2 minutes)                            │
│  ════════════════════════════                            │
│                                                          │
│  👨‍🍳😵 "I QUIT!" (crashed)                                │
│  ❌ 65% of customers left angry                           │
│  ✅ 35% got served                                        │
│                                                          │
├──────────────────────────────────────────────────────────┤
│                                                          │
│  QUEUE + PG (After 2 minutes)                            │
│  ════════════════════════════                            │
│                                                          │
│  🗄️😵 "Cabinet jammed!" (database overwhelmed)            │
│  ❌ 33% of customers left angry                           │
│  ✅ 67% got served                                        │
│                                                          │
├──────────────────────────────────────────────────────────┤
│                                                          │
│  PRODUCTION (After 1 HOUR!)                              │
│  ════════════════════════════                            │
│                                                          │
│  ✅ 720,448 customers served                              │
│  ✅ 100% success rate                                     │
│  ❌ 0 angry customers                                     │
│  Still running strong after 60 MINUTES!                  │
│                                                          │
└──────────────────────────────────────────────────────────┘
```

9) Final Comparison Table (All 3 Setups)

📊 The Final Comparison

🍔 BURGER SHOP COMPARISON 🍔

	STANDALONE	QUEUE+PG	PRODUCTION
CPU	🔴 112%	🟡 80%	🟢 6%
Memory	🔴 1.17 GB	🟡 980 MB	🟢 251 MB
Success	🔴 35%	🟡 67%	🟢 100%
Duration	🔴 2 min	🔴 2 min	🟢 1 HOUR+

```
└──────────────────────────────────────────────────────────────┘
```

10) Bottom Line (One-Liner)

Production wins because it removes bottlenecks and removes waste: nginx balances incoming load, workers execute separately, and PgBouncer prevents database connection storms—so performance stays stable even under sustained traffic.