**Project Design Phase**

**Solution Architecture**

| Date | 29 August 2025 |
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| Team ID | LTVIP2025TMID61019 |
| Project Name | Order On The Go |
| Maximum Marks | 4 Marks |

**Solution Architecture:**

The solution architecture for the **Order on the Go** is a food & beverage ordering platform that enables customers to pre-order, pay, and pick up (or receive delivery) with minimal friction. The solution connects **customers**, **restaurants/vendors**, **delivery partners**, and **payment gateways** through a cloud-native architecture, offering real-time status updates, optimized routing, and loyalty/rewards

**Goals of the Solution Architecture:**

**1 Business Goals**

* **BG1 – Faster ordering & pickup:** Reduce average customer order time to **< 60 seconds** and pickup wait time by **>30%**.
* **BG2 – Higher conversion & retention:** Improve conversion rate **+15%** and 30-day retention **+10%** via one-tap reorders and loyalty.
* **BG3 – Operational efficiency for vendors:** Reduce order errors **≥20%** with structured order tickets and dashboards.
* **BG4 – Revenue uplift:** Increase average order value via smart upsell/recommendations (**+8% AOV** target).

**2 Product Goals**

* **PG1 – Frictionless UX:** One-tap reorder, quick checkout, accessible interfaces.
* **PG2 – Transparent tracking:** Real-time order status and ETA for pickup/delivery.
* **PG3 – Personalization:** Contextual suggestions (favorites, time of day, location).
* **PG4 – Trust & reliability:** Clear notifications, accurate pricing, refund flows.

**3 Technical Goals**

* **TG1 – Cloud-native scalability:** Horizontal scaling for traffic bursts (lunch/dinner peaks).
* **TG2 – High availability:** **99.5%+** uptime with multi-AZ deployment and auto-healing.
* **TG3 – Security & compliance:** PCI-DSS for payment flows, TLS everywhere, encrypted PII at rest.
* **TG4 – Observability:** End-to-end tracing, structured logs, actionable alerts.
* **TG5 – Extensibility:** Modular services to add new geographies, partners, and payment gateways with minimal coupling.

**4) Scope (Phase 2 – Project Design)**

* **In scope:** Customer app (iOS/Android), vendor dashboard (web), delivery partner app, order management, payments, notifications, loyalty, basic analytics.
* **Out of scope (Phase 2):** Advanced ML pricing, marketplace ads, vendor self-serve onboarding (planned later).

**5) Stakeholders & Personas**

* **Customers:** commuters, busy parents, travellers.
* **Vendors/Restaurants:** kitchen staff, managers.
* **Delivery Partners:** couriers/drivers.
* **Internal:** product, engineering, data, ops, support, finance/compliance.

**6) High-Level Architecture (Overview)**

[ Mobile Apps (iOS/Android) ] [ Web Apps (Vendor/Admin) ]

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└──────► API Gateway / BFF ◄───┘

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Auth & Accounts Menu & Orders Payments Service

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│ │ ├──► Payment Gateway(s)

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Notifications Order Fulfillment ◄──► Delivery Service

│ │ (routing, ETA)

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└──► Event Bus / Streaming (Kafka/PubSub)

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Relational DB NoSQL (menus) Cache (Redis) Object Store

(users, orders) (catalog, logs) (sessions, (receipts,

hot data) images)

**Key Patterns:** API Gateway/BFF, microservices, event-driven messaging, polyglot persistence, CDN for assets, WebSockets/FCM for real-time.

**7) Core Components (Responsibilities)**

* **Auth & Accounts:** signup/login (OAuth/2FA), profiles, preferences, favorites.
* **Menu & Orders:** catalog, search/filter, cart, pricing, promotions.
* **Payments:** tokenized methods, checkout, refunds, ledgering, PCI segregation.
* **Order Fulfillment:** vendor queueing, preparation states, pickup slots, delivery dispatch.
* **Delivery Service:** courier assignment, live location, ETA, route optimization.
* **Notifications:** push/SMS/email templates, status triggers, retries.
* **Analytics/Reporting:** funnels, AOV, SLAs; privacy-aware telemetry.

**8) Data Flows (Summary)**

1. **Browse & Build Cart** → Menu service fetches catalog (cached), pricing & promos applied.
2. **Checkout** → Payment intent created → 3DS/UPI/wallet → confirmation → order created.
3. **Fulfillment** → Order to vendor queue; if delivery, courier assigned; ETA broadcast.
4. **Notify** → Real-time updates (accepted, prepared, ready, en-route, delivered).

**9) Technology Choices (Guidance)**

* **Frontend:** React Native (mobile), React.js (web), Tailwind UI.
* **Backend:** Node.js/Express or NestJS; GraphQL/REST; WebSockets.
* **Data:** PostgreSQL (core), MongoDB (menus/logs), Redis (cache), S3/GCS (media).
* **Realtime & Maps:** Firebase/FCM, Google Maps Platform.
* **Infra:** AWS/Azure/GCP, Docker + Kubernetes, NGINX ingress, CDN.
* **CI/CD & IaC:** GitHub Actions/Jenkins; Terraform; automated rollouts.
* **Observability:** OpenTelemetry, Prometheus/Grafana, ELK/Cloud Logging.

**10) Security & Compliance (Principles)**

* TLS 1.2+ end-to-end; AES-256 at rest for PII.
* PCI-DSS scope isolation: card data only via vetted gateway; no PAN storage.
* Role-based access control (customer/vendor/admin/driver) + least privilege.
* Secrets management (KMS/Vault), WAF/DDOS protection, rate limiting, abuse detection.

**11) Non-Functional Targets (Definition of Done)**

* **Availability:** ≥99.5% monthly uptime.
* **Performance:** P95 API < 250 ms; menu load < 3 s on 4G.
* **Scalability:** 5k concurrent users with linear horizontal scale.
* **Reliability:** idempotent writes; exactly-once payment effects.
* **Accessibility:** WCAG 2.1 AA for customer & vendor UIs.

**12) Success Metrics (tie to Goals)**

* Time-to-order (median) < **60 s**.
* On-time pickup/delivery rate ≥ **92%**.
* CSAT ≥ **85%**; App rating ≥ **4.5**.
* Order error rate ≤ **2%**; refund rate stable.

**13) Risks & Mitigations (Snapshot)**

* **Peak traffic spikes** → auto scale, circuit breakers, aggressive caching.
* **Gateway outages** → multi-provider payments; graceful degradation.
* **Location accuracy** → fallback providers; manual override of ETAs.

**14) Roadmap (Architecture-Relevant)**

* **MVP:** browse, one-tap reorder, checkout, pickup, basic delivery, notifications.
* **V1:** loyalty engine, vendor analytics, promo campaigns.
* **V2:** ML recommendations, dynamic slotting, advanced SLA routing.

**15) Glossary**

* **BFF:** Backend for Frontend.
* **ETA:** Estimated Time of Arrival.
* **AOV:** Average Order Value.
* **PII:** Personally Identifiable Information.

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