

[Technical Report] Merchant Service

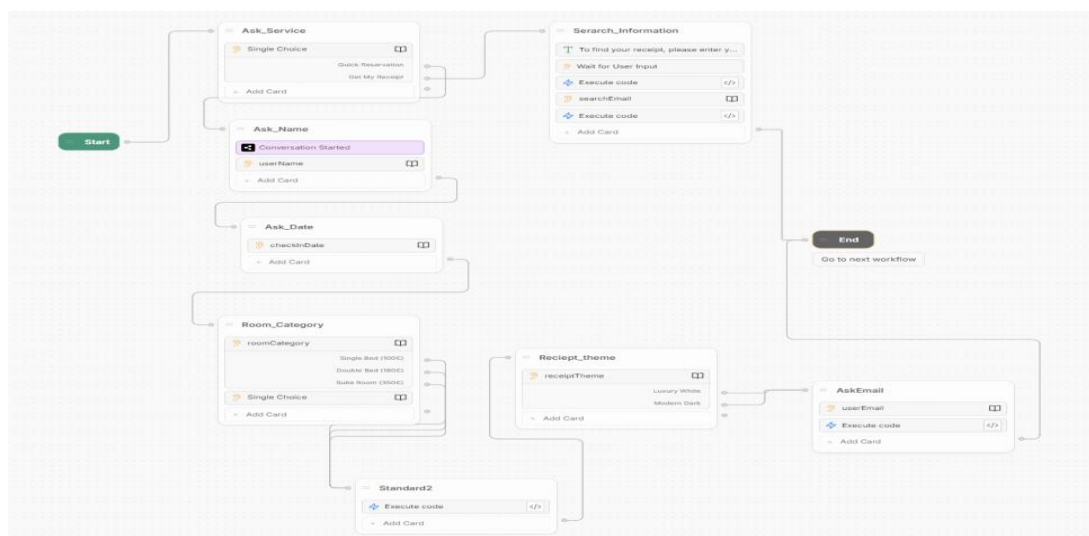
Automation: AI-Driven Reservation & Receipt Pipeline

1. Project Objective & Business Context


- **Industry Insight:** Leveraging professional experience in the hospitality sector, I identified manual receipt reissuance as a high-friction operational bottleneck, often leading to customer dissatisfaction and data entry errors.
- **Objective:** To architect an end-to-end AI automation pipeline that handles real-time reservations and instant document generation, ensuring **100% data integrity** and zero manual intervention.

2. System Architecture & Engineering Stack

- **Frontend (Conversational Interface):** **Botpress** – Orchestrated LLM-based intent recognition to capture unstructured user data.
- **Integration Layer:** **Make.com** – Managed complex workflow orchestration via **RESTful Webhooks** and JSON payload routing.
- **Data Persistence:** **Google Sheets DB** – Served as the primary source of truth for structured transaction records.
- **Output Engine:** **Google Workspace API** – Dynamically generated and delivered personalized PDF documents via automated SMTP protocols.



[illegible]



Doyeon Yoon
담당자

[Doyeoni Hotel] Receipt for mingee > **받은편지함**

Receipt Reissue

Dear mingee, here is your requested receipt from **Doyeoni Hotel**.

We have found your past reservation details as requested.

Reissued Details

Guest Name:

mingee

Check-In Date:

2026-05-14

Please find the attached PDF for your full receipt.

Doyeoni Hotel, Berlin.

첨부파일 1개 • Gmail에서 감상함   Drive에 추가



DOYEONI

RESERVATION RECEIPT

GUEST NAME

yejin

ROOM CATEGORY

Suite Room (350€)

CHECK-IN DATE

2026-03-17

CONFIRMATION NO.

TOTAL AMOUNT PAID

350 €

Figure 3. Real-time System Monitoring and Resource Usage Tracking

3. Critical Troubleshooting: Resolving the "Data Integrity" Challenge

The Issue: Null Values in Production Outputs

During initial stress testing, reissued receipts were found with missing **Price** and **Room Category** fields. This resulted in invalid financial documents, a critical failure for merchant-facing services.

Root Cause Analysis (RCA): Schema Mismatch

I identified a **data schema mismatch** in the asynchronous pipeline. The initial "Make Reservation" logic was capturing only identity data (Name/Email) and failing to commit transactional metadata (Price/Category) to the persistent database.

Engineering Solution: Pipeline Re-engineering

1. **Database Schema Optimization:** Expanded the backend schema to include specialized columns for full transactional metadata.
2. **Upstream Logic Refinement:** Re-engineered the Botpress data collection logic to ensure 100% of the required data payload is validated and committed at the first point of contact.
3. **Validation Layer:** Implemented conditional branch logic within the workflow to verify data completeness before triggering the document generation engine.

Outcome

Successfully eliminated the "Empty Field" failure mode, achieving **100% automated data accuracy** and ensuring system robustness for production-scale

DOYEONI

RESERVATION RECEIPT

GUEST NAME

minasu

ROOM CATEGORY


CHECK-IN DATE

CONFIRMATION NO.

TOTAL AMOUNT PAID

€

RESERVATION RECEIPT



GUEST NAME: yejin

ROOM CATEGORY: Suite Room (350€)

CHECK-IN DATE: 2026-03-17

TOTAL AMOUNT PAID: 350 €

Figure 4. Comparison of Output Integrity: Failed Null Values (Left) vs. Validated Transactional Data (Right)

4. Professional Impact & Scalability

- **Operational Excellence:** Eliminated manual intervention for repetitive merchant tasks, significantly reducing human error and operational latency.
- **Engineering Growth:** Demonstrated the ability to solve complex, ambiguous problems by bridging the gap between operational field experience and technical system implementation.
- **Future Scalability:** The current API-driven architecture is designed to integrate with further ML models for predictive guest insights or advanced revenue management.

5. User Interaction & Intent Classification (Emulator)

Logic Implementation: I designed a **Conversational UI** using the Botpress emulator to classify user intents at the first touchpoint. The system identifies whether a user requires a "New Reservation" or a "Receipt Reissuance" through Natural Language Understanding (NLU).

Dynamic Decision Branching: Based on the identified intent, the pipeline generates specific **JSON payloads** that trigger divergent workflows in the integration layer (Make.com). This ensures that the system only executes the necessary API calls, optimizing resource usage and system response time.

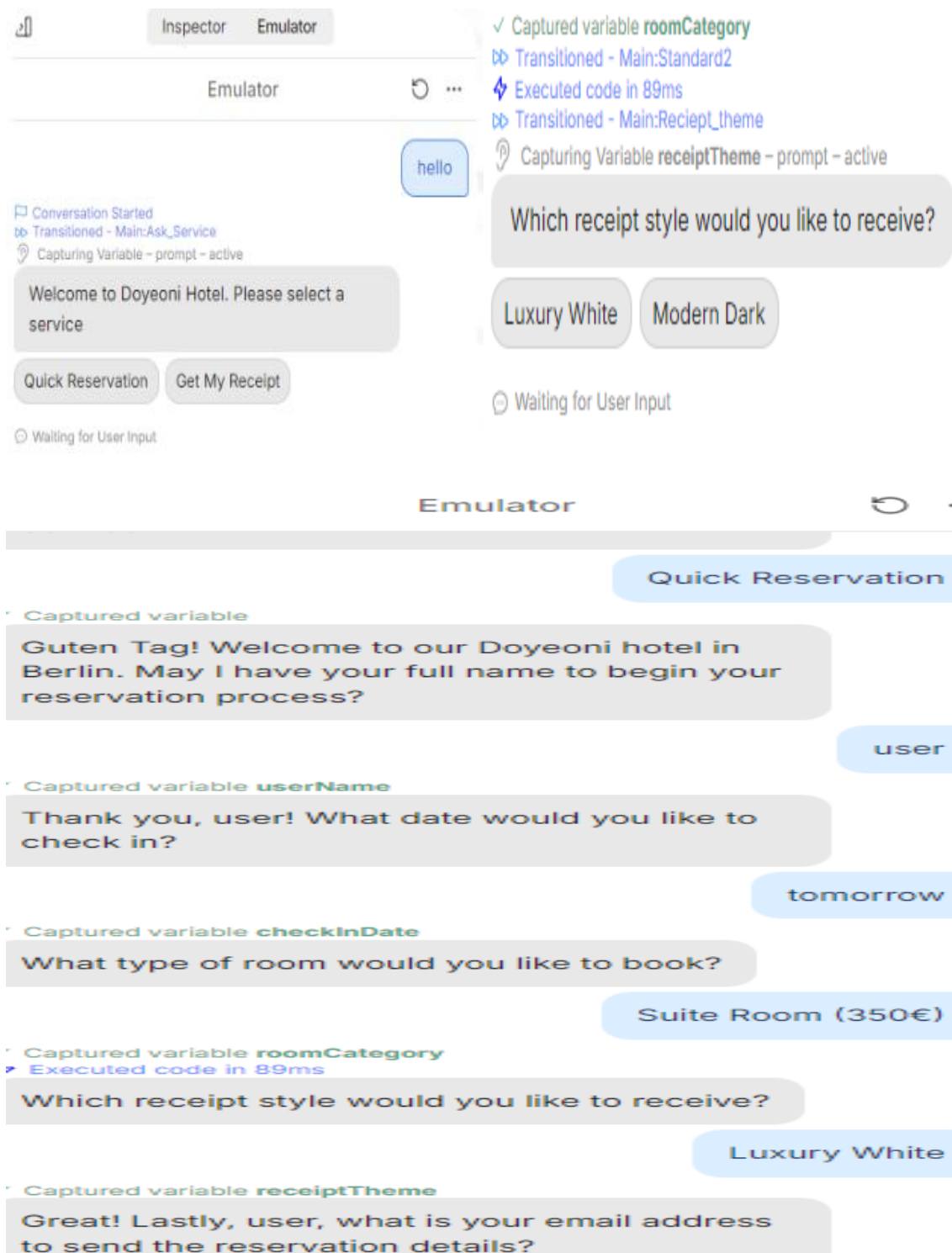


Figure 5. Conversational UI for Intent Classification: Diverging Workflows for New Reservations and Receipt Reissuance